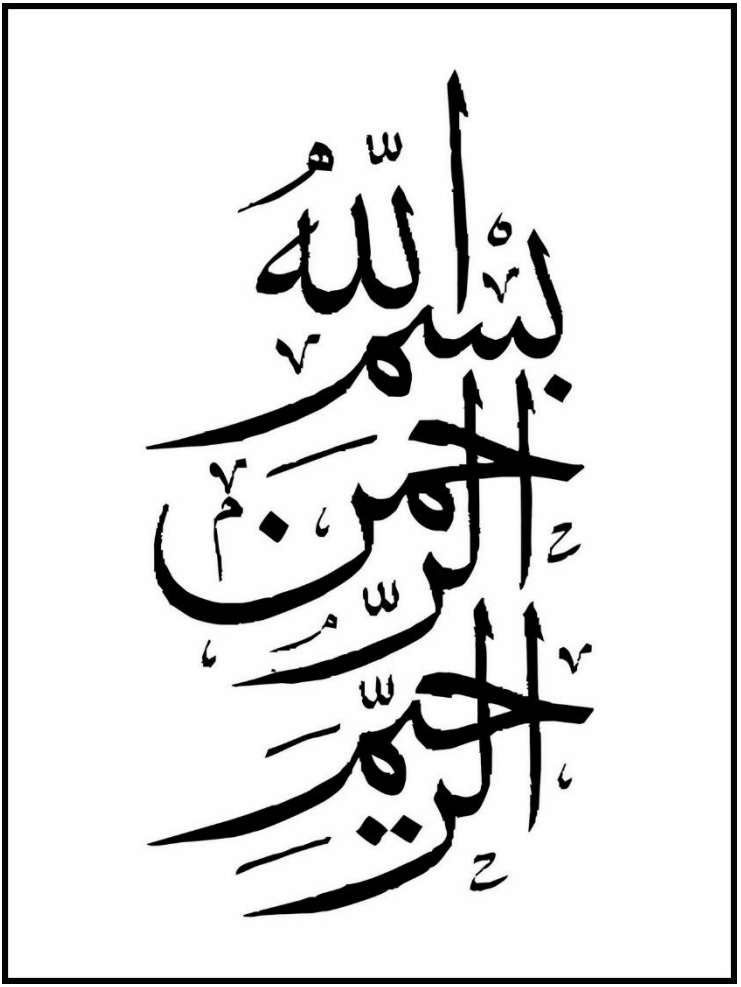
دانشگاه علم و فناوری مازندران

هشتمین کنفرانس پردازش سیگنال و سیستم های هوشمند ایران

۷ و ۸ دی ماه ۱۴۰۱، دانشگاه علم و فناوری مازندران


بسم الله
الرحمن
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چکیده نامه مقالات

هشتمین کنفرانس بین المللی سیگنال و سیستم های هوشمند ایران

۷ و ۸ دی ماه ۱۴۰۱

دانشگاه علم و فناوری مازندران

اعضای کمیته علمی

			
پرفسور عزیزالله معماریان دانشگاه خوارزمی	پرفسور احسان اله کبیر دانشگاه تربیت مدرس	پرفسور حمید حسن‌پور دانشگاه صنعتی‌شاهرود	پرفسور کریم فائز دانشگاه امیرکبیر
			
دکتر محمدرضا اکبرزاده دانشگاه فردوسی	دکتر حمید بیگی دانشگاه شریف	دکتر لیلی محمد خانلی دانشگاه تبریز	دکتر نعمت‌اله شیری Concordia university
			
دکتر وحید ابوالقاسمی University of Essex	دکتر امین زهتابیان Free University of Berlin	دکتر مجید فرقانی	دکتر مختار محمدی Lebanese French University

اعضای کمیته علمی

			
دکتر ناصر مزینی دانشگاه علم و صنعت ایران	دکتر محسن سریانی دانشگاه علم و صنعت ایران	دکتر رضا انتظاری دانشگاه علم و صنعت ایران	دکتر امیر موسوی‌نیا دانشگاه خواجه نصیرالدین طوسی
			
دکتر اسدالله شاه بهرامی دانشگاه گیلان	دکتر یوسف درمانی دانشگاه خواجه نصیرالدین طوسی	دکتر سید حسین خواسته دانشگاه خواجه نصیرالدین طوسی	دکتر بابک ناصرشریف دانشگاه خواجه نصیر الدین طوسی
			
دکتر بهروز مینایی دانشگاه علم و صنعت ایران	دکتر چیترا دادخواه دانشگاه خواجه نصیرالدین طوسی	دکتر سعید پاشازاده دانشگاه تبریز	Dr. Nabeel Ali Khan Foundation University

اعضای کمیته علمی

			
دکتر محمد غفاری University of Auckland	دکتر محمد قاسم زاده دانشگاه یزد	دکتر علیرضا سوری Halic University	**دکتر محمدمهدی عیان‌نژادی** دانشگاه علم و فناوری مازندران
			
دکتر موسی نظری دانشگاه علم و فناوری مازندران	دکتر علی قنبری دانشگاه علم و فناوری مازندران	دکتر جمشید پیرگرزی دانشگاه علم و فناوری مازندران	دکتر رضا جوانمرد دانشگاه علم و فناوری مازندران
			
دکتر احمد کمندی دانشگاه علم و فناوری مازندران	دکتر محمدمهدی پورهاشم دانشگاه علم و فناوری مازندران	دکتر نبی اله رمضانی دانشگاه علم و فناوری مازندران	دکتر علی کرمانی دانشگاه علم و فناوری مازندران

اعضای کمیته علمی

			
دکتر سید رضا عبداللهی دانشگاه علم و فناوری مازندران	دکتر اشکان فخری دانشگاه علم و فناوری مازندران	دکتر علیرضا ذکریازاده دانشگاه علم و فناوری مازندران	دکتر میلاد نیازآذری دانشگاه علم و فناوری مازندران
			
دکتر علی طهماسبی دانشگاه علم و فناوری مازندران	دکتر عبدالبر ملاح دانشگاه علم و فناوری مازندران	دکتر هدی مشایخی دانشگاه شاهرود	دکتر منصور فاتح دانشگاه شاهرود
			
دکتر علیرضا تجری دانشگاه شاهرود	دکتر محمد حسین تبارمرزبالی دانشگاه شاهرود	دکتر زهرا امیری دانشگاه شاهرود	دکتر محمود معلم دانشگاه دامغان

اعضای کمیته علمی

			
دکتر مهدی صادقی زاده دانشگاه قوچان	دانشگاه سعید دوست علی دانشگاه کاشان	دکتر فرشاد تیموری دانشگاه آزاد اسلامشهر	دکتر محمدحسین اولیائی دانشگاه گناباد
			
دکتر حمید جزایری دانشگاه نوشیروانی بابل	دکتر میثم یدالله زاده طبری دانشگاه آزاد بابل	دکتر محمدمهدی حسینی دانشگاه آزاد شاهرود	**دکتر ابوالفضل یاوری خلیل ابادی** دانشگاه پیام نور کاشمر
			
			دکتر سید محمدرضا هاشمی Lebanese French University

اعضای کمیته اجرایی

			
دکتر اکبر هاشمی برزآبادی دبیر کنفرانس دانشگاه علم و فناوری مازندران	دکتر حمید حسن‌پور دبیر علمی دانشگاه صنعتی شاهرود	دکتر محمدمهدی علیان نژادی دبیر اجرایی دانشگاه علم و فناوری مازندران	دکتر محمدرضا امامی دبیر کمیته هماهنگی دانشگاه علم و فناوری مازندران
			
دکتر علی طهماسبی دبیر کمیته فناوری اطلاعات دانشگاه علم و فناوری مازندران	دکتر علی قنبری سرخی رئیس کمیته مالی دانشگاه علم و فناوری مازندران	دکتر نبی الله رمضانی دبیر کمیته روابط عمومی دانشگاه علم و فناوری مازندران	دکتر اشکان فخری دبیر کمیته روابط بین الملل دانشگاه علم و فناوری مازندران
			
دکتر رضا جوانمرد دبیر کمیته روابط بین الملل دانشگاه علم و فناوری مازندران	دکتر جمشید پیرگزی دبیر کارگاه ها دانشگاه علم و فناوری مازندران	دکتر علیرضا زکریازاده دبیر کمیته پایگاه داده ها و مقالات دانشگکاه علم و فناوری مازندران	دکتر موسی نظری دبیر انتشارات دانشگاه علم و فناوری مازندران

اعضای کمیته اجرایی

			
دکتر محمد عرب‌فیروزجایی مدیر داخلی دانشگاه علم و فناوری مازندران	**دکتر احمد کمندی** مدیر ارتباط با صنعت دانشگاه علم و فناوری مازندران	**دکتر علی کرمانی** دبیر کمیته تدارکات و امور اجرایی دانشگاه علم و فناوری مازندران	**دکتر میلاد نیاز آذری** دبیر کمیته پشتیبانی دانشگاه علم و فناوری مازندران
			
دکتر عبدالبر ملاح دبیر کمیته تشریفات دانشگاه علم و فناوری مازندران	**دکتر مهدی پورهاشم** دبیر کمیته تبلیغات دانشگاه علم و فناوری مازندران	**دکتر محمد اسلامیان بیجا** دبیر کمیته حمل و نقل دانشگاه علم و فناوری مازندران	**محمد جعفری فوتمی** پشتیبانی فناوری اطلاعات دانشگاه علم و فناوری مازندران
			
زهرا عادلانی پشتیبان فناوری اطلاعات دانشگاه علم و فناوری مازندران	**سپهر یگانه** عضو دانشجویی کمیته اجرایی دانشگاه علم و فناوری مازندران	**حسام الدین پوررستمی** عضو دانشجویی کمیته اجرایی دانشگاه علم و فناوری مازندران	**مهدی حسین زاده** عضو دانشجویی کمیته اجرایی دانشگاه علم و فناوری مازندران

اعضای کمیته اجرایی

			
ارغوان قربان زاده عضو دانشجویی کمیته اجرایی دانشگاه علم و فناوری مازندران	نیلوفر صدیق زاد لنگرودی عضو دانشجویی کمیته اجرایی دانشگاه علم و فناوری مازندران	مریم نبوی عضو دانشجویی کمیته اجرایی دانشگاه علم و فناوری مازندران	محمدرضا باقرزادگان عضو دانشجویی کمیته اجرایی دانشگاه علم و فناوری مازندران
			
امیررضا الله وردی عضو دانشجویی کمیته اجرایی دانشگاه علم و فناوری مازندران			

محور های کنفرانس

- پردازش سیگنال
- پردازش صوت و گفتار
- پردازش تصویر و ویدئو
- بینایی ماشین
- سنجش از دور
- تحلیل و بازشناسی الگو
- داده کاوی
- محاسبات نرم
- بهینه سازی
- سیستم های هوشمند
- شبکه های کامپیوتری هوشمند
- شبکه های الکتریکی هوشمند
- اینترنت اشیا

پیام رئیس کنفرانس

بسمه تعالی

بسیار مفتخریم که با استعانت از خداوند متعال و حمایت رئیس محترم دانشگاه علم و فناوری مازندران، میزبان هشتمین کنفرانس پردازش سیگنال و سیستم های هوشمند ایران در روزهای هفتم و هشتم دی ماه سال ۱۴۰۱ و در شهر زیبای بهشهر هستیم. توفیق آن را داریم تا با همت همکاران کوشا و به منظور بهره‌مندی از دستاوردهای پژوهشی همه پژوهشگران فعال در حیطه‌های موضوعی کنفرانس، این رویداد مهم را به صورت مجازی برگزار نماییم. خوشبختانه شاهد استقبال شایسته ای از سوی پژوهشگران، اساتید و دانشجویان عزیز در برگزاری این گردهمایی بوده‌ایم و امیدواریم میزبان شایسته‌ای برای عزیزان باشیم. لازم است از حسن اعتماد دبیرخانه دائمی کنفرانس برای سپردن میزبانی به دانشگاه علم و فناوری مازندران به ویژه آقای دکتر حسن‌پور که زحمت دبیری علمی کنفرانس را نیز به عهده دارند نهایت سپاسگزاری و قدردانی بعمل آید. همچنین از اعضای محترم کمیته علمی و داوران عزیز و همچنین آقای دکتر علیان‌نژادی، دبیر محترم اجرایی و همکاران بزرگوار ایشان در کمیته اجرایی و به ویژه دانشجویان عزیز فعال در برگزاری کنفرانس، بابت تلاش‌های فراوان در فراهم نمودن مقدمات برگزاری کنفرانس، سپاسگزاری می‌گردد. امید است حضور اندیشمندان، پژوهشگران و دانشجویان عزیز در این کنفرانس موجبات تبادل و پویایی علمی را فراهم آورده و گامی موثر در اعتلای دانش و پژوهش میهن عزیزمان باشد.

اکبر هاشمی برزآبادی

دبیر هشتمین کنفرانس پردازش سیگنال و سیستم های هوشمند ایران

برنامه کنفرانس

چهارشنبه ۷ دی ۱۴۰۱	(یادگیری عمیق)(دکتر علی قنبری، دکتر رضا جوانمرد) (پردازش سیگنال)(دکتر علی کرمانی، دکتر علیرضا ذکریازاده) (الگوریتم های مکاشفه ای) دکتر اکبر هاشمی، دکتر اشکان فخری) (یادگیری ماشین)(دکتر جمشید پیرگزی، دکتر موسی نظری) (سیستم های هوشمند)(دکتر محمدمهدی پورهاشم، دکتر سعید دوستعلی)	۹:۰۰ – ۹:۳۰	افتتاحیه	
		۹:۳۰ – ۱۰:۳۰	سخنرانی کلیدی	دکتر محسن سریانی
		۱۰:۳۰ – ۱۱:۳۰	سخنرانی کلیدی	دکتر امین زهتابیان
		استراحت و نماز		
		زمان	کد مقاله	ارائه دهنده
		۱۳:۰۰ – ۱۳:۳۰	۲۰۳	محمد رحیمی
			۱۷۱	مرضیه دخانچی
			۱۴۷	هادی سلیمی
			۱۶۱	بهاره قاری رستمی
			۲۴	سعید بهزادی پور
		۱۳:۳۰ – ۱۴:۰۰	۱۵۶	معصومه بهلولی
			۱۴۰	شیوا حسین اوغلی
			۵	محمد شهرآئینی
			۱۷۶	احمد کمندی
			۹۹	محمدعلی زنجانی
		۱۴:۰۰ – ۱۴:۳۰	۱۶۰	زهرا الهیان
			۲۰۰	علی اخلاصی
			۱۳۴	مهسا حسن‌پور عزیزی
			۱۱۱	امیرعلی رایگان
			۱۷۸	حسین شاهین زاده
		۱۴:۳۰ – ۱۵:۰۰	۱۸۳	محمدرضا کاویان پور
			۲۱	فاطمه دانشور
			۱۳	محمد شهرآئینی
			۱۶۲	رضا احمدی خطیر
			۲۰۱	کیوان آصفپور وکیلیان
		۱۵:۰۰ – ۱۵:۳۰	۱۳۰	پرنیا صیفی
			۲۵	رضا یوسفی مشهور
			۱۰۹	امیرحسین شکوهی
			۱۳۳	عرفان صابری
			۲۹	فاطمه خلیفه ای
		۱۵:۳۰ – ۱۶:۰۰	۶۷	احسان تحویلیان
			۲۰۸	حسین اسماعیلی
			۹	محمد حسن نیکخواه
			۵۴	علیرضا کیانفر
		۱۶:۰۰ – ۱۷:۰۰	نشست نان	

برنامه کنفرانس

پنجشنبه ۸ دی ۱۴۰۱	(یادگیری عمیق)(دکتر علی قنبری، دکتر محمد غفاری) (یادگیری ماشین)(دکتر موسی نظری، دکتر سعید دوستعلی) (پردازش تصویر)(دکتر فرشاد تیموری، دکتر مختار محمدی) (شبکه های هوشمند)(دکتر علیرضا ذکریازاده، دکتر علی کرمانی، دکتر میلاد نیازی آذری) (بهینه سازی)(دکتر اکبر هاشمی، دکتر اشکان فخری)	۹:۰۰ – ۹:۳۰	۱۷۹	احسان احسائیان
			۱۲۱	مصطفی علویان شهری
			۱۹۸	مهدی مروی
			۸۳	پیمان وفادوست
			۸	مسعود خوری
		۹:۳۰ – ۱۰:۰۰	۲۳	محمد صادق گرشاسبی
			۱۶۶	فاطمه قلگرزاده
			۱۳۹	حبیب الله آق عطابایی
			۱۲۰	محمد زوار
			۱۸۱	عرفان خوشنویسان
		۱۰:۰۰ – ۱۰:۳۰	۷۷	مهدی اجتهادی
			۱۶۸	سینا سلطانی
			۸۱	مهسا تاجیک
			۱۷۰	مهدی نجف زاده
			۲۲	علی اسلامیان
		۱۰:۳۰ – ۱۱:۰۰	۱۴۹	Hasanain Ali Hussein Al-Kaabi
			۷۶	نیما مظفری خسروی
			۷۲	فربد سیاهکلی
			۱۰۳	سعید غضنفری راد
			۱۷۷	مریم تقی زاده
		۱۱:۰۰ – ۱۱:۳۰	۲۰۹	علیرضا رهنما
			۱۳۱	محبوبه شریف مقدم
			۲۷	آرزو مکاری
			۱۷۴	افسانه آجدانی
		۱۱:۳۰ – ۱۲:۰۰	۱۴۶	حبیب ایزدخواه
		نماز و استراحت		
		۱۳:۰۰ – ۱۳:۳۰	۱۹	علی نظری‌زاده
			۲۰۶	محمدمهدی علیان‌نژادی
			۹۴	افروز شیخ‌الاسلامی
			۲۰۴	حسین شاهین‌زاده
			۲۰۵	اشکان فخری
		۱۳:۳۰ – ۱۴:۰۰	۱۱	سبحان نادریان
			۱۹۷	مجید فرقانی
			۶۰	اسماعیل خزائی
			۱۹۱	محمد شهرآئینی

برنامه کنفرانس

پنجشنبه ۸ دی ۱۴۰۱	(یادگیری عمیق)،(دکتر علی قنبری، دکتر محمد غفاری) (یادگیری ماشین)، (دکتر موسی نظری، دکتر سعید دوستعلی) (پردازش تصویر)،(دکتر فرشاد تیموری، دکتر مختار محمدی) (شبکه های هوشمند)،(دکتر علیرضا ذکریازاده، دکتر علی کرمانی، دکتر میلاد نیازی آذری) (بهینه سازی)،(دکتر اکبر هاشمی، دکتر اشکان فخری)		۱۸۵	کیوان عاصفپور وکیلیان
		۱۴:۰۰ – ۱۴:۳۰	۱۹۵	فرشید رجبی
			۷۱	محجوبه تاجگردون
			۱۸۶	ویدا صفردول‌آبادی
			۱۷	محمدرضا قادری
			۱۶۷	محمد جاویدان
		۱۴:۳۰ – ۱۵:۰۰	۱۸۹	آرش غفوری
			۱۹۰	محمدرضا حسن‌پور چرمچی
			۱۴۱	محمدرضا رضوان
			۱۳۸	مینا سالاریان
			۶۶	اعظم سیل‌سپور
		۱۵:۰۰ – ۱۵:۳۰	۱۶۳	محمد شبیری
			۱۹۶	فرزانه کاظم زاده
			۱۱۲	محمدرضا قادری
			۱۸	حمیدرضا امیری
			۲۱۰	سحر احمدزاده
		۱۵:۳۰ – ۱۶:۰۰	۱۵۵	سپهر ملکی
			۹۶	عطیه آرمین
			۱۹۳	فاطمه آهنگر
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Performance Comparison between Simple and Adam–Eve-Like Genetic Algorithms in Optimal PMU Placement Problem

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Abstract

In this research, the Adam–Eve algorithm is inves-tigated, and its performance is compared with the simple genetic algorithm. The simple genetic algorithm is the simplest type of genetic algorithm in which the population size is constant, and the probability of mutation and crossover in it does not change over different generations. Adam–Eve algorithm is one of the adaptive algorithms that the number of population and rates of mutation and crossover in it are variable. In this research, both algorithms are implemented, and they are used to solve the phasor measurement unit placement problem in the power system. The simulation results show that the probability of achieving global optimal in the Adam–Eve algorithm is higher, although the convergence speed of this algorithm decreases.

Index Terms—Simple Genetic Algorithm, Adaptive Genetic Algorithm, Adam–Eve Genetic Algorithm, Optimal PMU Place-ment.

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An Automatic Method for Image Steganography Using Jensen Similarity Criterion

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Abstract

Steganography, an important component of security systems, plays an essential role in the information security mechanisms. Among various types of steganography, image steganography has attracted lots of attention in the academic community. Despite the increasing development of the image steganography solutions, there are still some concerns about their level of security. In this paper, we propose a new image steganography scheme which is based on Least-Significant-Bit (LSB) substitution and Jensen Similarity Criterion. The proposed method first divides both the LSBs of the input image and the bitstream of the secret message into several blocks. Then, our method employs the Jensen similarity criterion over each block of the message and the reversed message to choose its closest block in the image. We repeat these operations by changing of scroll type of bits in the image until the highest PSNR is obtained. Finally, each secret message block is hidden into its corresponding image block selected in the previous step. Our experimental results show that our approach achieves a very high level of hiding capacity. Moreover, the results demonstrate that our approach provides around 4.5% higher visual quality compared to the state of the art methods and measured by the Peak Signal-to-Noise-Ratio (PSNR).

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A Modified Evolutionary Method for Multi-Area Dynamic Environmental Economic Dispatch

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Abstract

Dynamic economic dispatch attempts to find the most cost-effective combination of power generation units at different time intervals while meeting operational constraints. However, most economic dispatch programs do not meet environmental expectations. Therefore, balancing power generation costs with environmental concerns is a significant challenge that has recently attracted significant study attention in the power system. This paper introduces a novel approach for solving the Multi-Area Dynamic ED (MADED) problem in the presence of practical constraints such as valve-point effect, prohibited operating zones (POZs), and ramp-rate limitations. Generation cost and emissions are considered as objective functions in this study. The proposed multi-objective problem is solved using the modified Particle Swarm Optimization (MPSO) algorithm, which is presented and put into practice. A ten-unit, three-area system is used to expound on the performance and accuracy of the suggested technique. The results obtained are compared with those from the literature to show the applicability of the suggested approach.

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Machine learning approach for non-intrusive load monitoring in smart grids: new deep learning method based on long short-term memory and convolutional neural networks

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Abstract

Non-intrusive load monitoring (NILM), is a single-input blind source discrimination problem, aims to transform the mains user electricity consumption into appliance level measurement in smart grids. New approach for NILM has been proposed in this article that uses combination of long short-term memory (LSTM) networks and convolutional neural networks (CNN). Deep neural networks have been shown a significant solution for these types of problems because of their computation power and huge number of trainable parameters. Proposed hybrid method could significantly increase the overall accuracy of NILM, because it benefits from both deep networks' advantages. It applies sequence to sequence learning, which predefined window of the consumption is fed as an input and the output is a window of the specified appliance consumption data. The proposed deep neural network method has been applied to real-world household energy data set "REFIT". In this study the REFIT data set has been used, and electricity consumption data of 20 households with nine appliances measured at 8-second intervals. The electricity usage data have been recorded regularly over a two-year period for 20 households located in the UK. The proposed method achieves significant performance, improving accuracy, F1-score and estimated energy measures by 95.93%, 80.93% and 93.67%, respectively that validates accuracy and performance. Comparison of the proposed method's results and recently published studies has been presented and discussed based on accuracy, number of considered appliances and the size of the deep neural network's trainable parameters. The proposed method shows remarkable performance compared to past studies.

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Comparison of Meta-Heuristic Algorithms for Solving Dominating Set Problems in WAMS Design

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Abstract

Wide area measurement system (WAMS) integrates new digital metering devices (e.g. PMUs), and modern and high speed communication systems to measure the parameters of the network in wide geographical area. In a WAMS, measuring de- vices like PMUs form a measurement infrastructure that gathers raw data from the grid, while a communication infrastructure should be implemented to transmit such data to the control center(s). Due to the importance of WAMS in the operation of smart grids and also the high price of its implementation, the design of WAMS has been one of the research fields of interest in recent years. As WAMS consists of two different infrastructures, i.e. measurement and communication, there are three different approaches to WAMS design: separated, sequential, and com- prehensive. The comprehensive method means the simultaneous design of two WAMS infrastructures in the form of a general optimization problem, whose its complex network equivalent is finding the minimum connected dominant set (MCDS). In this paper, in order to compare the performance of meta-heuristic algorithms in comprehensive WAMS design (i.e., finding the MCDS for a power graph), a new algorithm based on the ant colony optimization and a pheromone modification technique is proposed. Through simulations for three IEEE test cases, we have shown that the proposed algorithm brings %17–%25 saving in the investment cost in comparison with previous algorithms.

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Application of Machine Learning Techniques In Phased Array Antenna Synthesis

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Abstract

In this article, we investigate and review the application of artificial intelligence (AI) in phased array antenna (PAA) synthesis. PAA design and optimization under practical constraints is a critical issue. In conventional methods of PAA synthesis, the elements of array are considered isolated without considering the destructive effects of mutual coupling or the effects of mounting-platform. Therefore, the obtained results are not useful in practice. In addition, PAA synthesis by conventional electromagnetic models is difficult and has high error in some cases due to the required computational resources and long simulation time. Using machine learning (ML) techniques in PAA synthesis is a way to overcome these challenges. In this article, we investigate and review ML techniques in PAA synthesis and show how the use of ML techniques leads to the optimization of PAAs in telecommunication systems.

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Monitoring and Evaluation of Wind Turbines Status Based on SCADA and ADSP Data Analysis

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Abstract

The role of control and monitoring components in any system is unavoidable. In this regard, wind turbine farms need control and monitoring units to reduce potential costs and increase reliability. Monitoring units of wind turbines use input data to monitor all parts of the farm on a full-time basis and send some operational commands to the system as needed. Regardless of the type of commands and the type of monitoring, the commands received by the system require complete information and accurate processing of the status of the turbine. As a result, in this study, we review and compare the SCADA and ADSP data analysis methods for monitoring the status of wind turbines. First, each method is evaluated individually, then the advantages and disadvantages of the two methods are compared, and finally, recommendations are given for using the methods in different situations in order to realize the highest reliability.

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Using Group Deep Learning and Data Augmentation in Persian Sentiment Analysis

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Abstract

Sentiment analysis is one of the most important areas in natural language processing, which investigates people's opinions on products, services and various events. The number of papers published on Persian sentiment analysis is much less than other languages such as English, and this made our research in Persian and use different approaches to increase the accuracy of Persian sentiment analysis. In this research, Group Deep Learning and Data Augmentation approach has been used to classify emotions in Persian, which has not been used in any previous research to analyze Persian emotions. After applying Data Augmentation technique and using Group Deep Learning approach for classification, we achieved 96.5% accuracy in Persian sentiment analysis.

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Det-SLAM: A semantic visual SLAM for highly dynamic scenes using Detectron2

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Abstract

According to experts, Simultaneous Localization and Mapping (SLAM) is an intrinsic part of autonomous robotic systems. Several SLAM systems with impressive performance have been invented and used during the last several decades. However, there are still unresolved issues, such as how to deal with moving objects in dynamic situations. Classic SLAM systems depend on the assumption of a static environment, which becomes unworkable in highly dynamic situations. Several methods have been presented to tackle this issue in recent years, but each has its limitations. This research combines the visual SLAM systems ORB-SLAM3 and Detectron2 to present the Det-SLAM system, which employs depth information and semantic segmentation to identify and eradicate dynamic spots to accomplish semantic SLAM for dynamic situations. Evaluation of public TUM datasets indicates that Det-SLAM is more resilient than previous dynamic SLAM systems and can lower the estimated error of camera posture in dynamic indoor scenarios.

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Fuzzy-based Deep Reinforcement Learning for Frost Forecasting in IoT Edge-enabled Agriculture

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Abstract

The critical impacts of climate change on agriculture can reduce agricultural productivity and surge prices. With the current issues in the agricultural sector, agricultural engineers have studied the advent of cyber-physical systems to handle these problems, especially in frost forecasting for crop management. This paper discusses the concepts of frost forecasting in smart agriculture and designs a three-layer infrastructure for smart farming equipped with the Internet of Things (IoT) technology. In addition, a novel Fuzzy-based Deep Reinforcement Learning (FDRL) is proposed to predict frosts in IoT-enabled agriculture. We use a dataset that includes five years of climate conditions of Khalkhal city in northwest of Iran in order to evaluate the performance of the proposed approach. The obtained results from implementations are assessed based on different metrics, such as Mean Absolute Error (MAE) and F-score, and compared with other Machine Learning (ML) algorithms. The results show the outperformance of FDRL compared to different ML-based algorithms.

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Validating TTGO T-Wristband Smart Band for the Lee Silverman Voice Treatment-BIG and Functional Activities

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Abstract

Inertial Measurement Units have become one of the most widely used instruments in Human Activity Recognition and clinical applications. Their performance needs to be validated against gold standard systems to be reliably used for any particular application. In this study, we validated MPU9250 in TTGO T-Wristband smart band (Shenzhen Xinyuan Electronic Technology© Ltd.) against MetaMotionR (MBIENTLAB®, San Fransisco, USA) for the Lee Silverman Voice Treatment-BIG (LSVT-BIG) and functional activities. The validation metrics in this study are the Pearson's correlation and Root Mean Square Error (RMSE) between acceleration and gyroscope readings, the Bland-Altman plots for the error in acceleration magnitudes, and linear regression on the error in acceleration magnitudes. Our results show that sensor readings between the IMUs were highly correlated, with a few exceptions. RMSE was mostly less than $\mathbf{0.05g}$ and $\mathbf{15°/s}$. Proportional biases between the error in acceleration magnitudes and the mean acceleration magnitudes were mostly insignificant, with the significant ones having a slope of no greater than $\mathbf{0.1}$ over a range of at most $\mathbf{2g}$. Our findings show that the TTGO T-Wristband is a valid choice for kinematic measurements for LSVT-BIG and functional activities.

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HeartSiam: A Domain Invariant Model for Heart Sound Classification

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Abstract

Cardiovascular disease is one of the leading causes of death according to WHO. Phonocardiography (PCG) is a cost-effective, non-invasive method suitable for heart monitoring. The main aim of this work is to classify heart sounds into normal/abnormal categories. Heart sounds are recorded using different stethoscopes, thus varying in the domain. Based on recent studies, this variability can affect heart sound classification. This work presents a Siamese network architecture for learning the similarity between normal vs. normal or abnormal vs. abnormal signals and the difference between normal vs. abnormal signals. By applying this similarity and difference learning across all domains, the task of domain invariant heart sound classification can be well achieved. We have used the multi-domain 2016 Physionet/CinC challenge dataset for the evaluation method. *Results:* On the evaluation set provided by the challenge, we have achieved a sensitivity of 82.8%, specificity of 75.3%, and mean accuracy of 79.1%. While overcoming the multi-domain problem, the proposed method has surpassed the first-place method of the Physionet challenge in terms of specificity up to 10.9% and mean accuracy up to 5.6%. Also, compared with similar state-of-the-art domain invariant methods, our model converges faster and performs better in specificity (4.1%) and mean accuracy (1.5%) with an equal number of epochs learned.

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Efficient Top-k Keyword Search in Relational Databases Considering Maximum Integrated Candidate Network (MICN)

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Abstract

In the era of Big Data, exploring vast amount of information without requiring to have knowledge of the query language and the underlying structure of data is very essential. Keyword search over RDBMSs (Relational Database Management Systems) has been an interesting method for this issue during the past decade. Although, many approaches have been proposed in this hot research topic, they still suffer from low effectiveness in retrieving top-k most related answers on real datasets. In this paper, an approach is proposed that can construct a Maximum Integrated Candidate Network (MICN) to avoid all the repetitive operations in order to answer most of queries efficiently. MICN can be build up with the minimal database access which causes effective response time. Based on comprehensive empirical studies using multiple real-world databases including ISC citation center data in practical mode, the proposed approach significantly improves the efficiency of answering queries.

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FPGA based designing Central processing unit of Implantable Cardiac Defibrillators with using CNN deep neural network

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Abstract

The heart is one of the most important organs of the human body. Diagnosis and timely treatment of cardiac arrhythmias are important issues in the construction of medical equipment that protects the heart. Arrhythmias of the heart such as ventricular fibrillation (VF) and ventricular tachycardia (VT) must be identified and treated as soon as possible. Implantable cardioverter-defibrillator (ICD) is a device that must detect VT and VF arrhythmias in a timely manner and treat them. Signal processing and arrhythmia detection of implant defibrillator devices is one of the most important parts of these devices and should be optimal in terms of detection time and detection accuracy. In this paper, an artificial neural network based on deep learning has been designed for use in signal processing and arrhythmia detection sections of ICD defibrillator devices. The designed convolution neural network is in good condition in terms of accuracy and is also in optimal condition in terms of the number of parameters. The optimal number of parameters can increase network speed in signal processing and arrhythmia detection and can also be useful in reducing battery consumption. Finally, the designed CNN network hardware was implemented. zynq chips have the ability to process in parallel and can be useful in increasing the processing speed, so zynq chips were selected for the hardware target. After the hardware implementation stage, it is possible to proceed from the IP Core produced to design other parts of the defibrillator in the Vivado software.

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Self-supervised Sentiment Classification based on Semantic Similarity Measures and Contextual Embedding using metaheuristic optimizer

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Abstract

In recent years, considerable research attention has been paid to supervised machine learning methods for Sentiment Analysis (SA). The performance of these methods heavily depends on hyperparameter tuning and varies across different contexts. In addition, getting a massive amount of labeled training data is time-and labor-consuming. As a result, unsupervised machine learning methods are getting more attention. This paper proposes a Self-supervised sentiment analysis method that semantically generates pseudo-labels (positive or negative) for each sample using the text similarity measures. Moreover, a sentiment classifier composed of the RoBERTa transformer and a Gated Recurrent Unit (GRU) is trained by these labeled data. What is more, Whale Optimization Algorithm (WOA) is employed to find the optimal values of hyperparameters. The evaluation results demonstrate that the proposed method outperforms other methods in terms of accuracy, precision, and recall.

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Accuracy improvement in simple and complex Human Activity Recognition using a CNN-BiLSTM multi-task deep neural network

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Abstract

Human Activity Recognition (HAR) using wearable systems in telerehabilitation and clinical applications has caught the attention of many researchers, especially for Parkinson's disease (PD) movement therapy. However, the distinction between simple activities and complex ones and how to handle them have not been thoroughly investigated. We propose and compare two variants of a multi-task network with shared parameters to recognize simple activities (SAs) and complex activities (CAs) simultaneously. We do so by introducing a branched deep neural network that uses a shared feature space for both SAs and CAs, and further enriches the features for CAs using a deep recurrent neural network. The variants are CNN-LSTM and CNN-BiLSTM. We trained and evaluated the models with 65 activities; 51 SAs and 14 CAs composed of Lee Silverman Voice Treatment-BIG (LSVT-BIG) and functional activities. Our dataset consisted of 43 healthy subjects, seven women and 36 men. The data were recorded using four smart bands with embedded IMUs, placed on both wrists and both thighs. Our results show that the CNN-BiLSTM model with an average accuracy of 84.17% and 78.78% for SAs and CAs, correspondingly, outperforms the CNN-LSTM model with average accuracies of 71.83% and 66.46%.

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A Reinforcement Learning-based Iterated Local Search for Software Modularization

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Abstract

Modularization algorithms are used to recover software structure. These algorithms partition the source code of the software system into smaller and more understandable modules. Since software modularization is an NP-hard problem, heuristics/meta-heuristics methods are usually used to solve this problem. Iterated Local Search (ILS) is a meta-heuristic that consists of two key components, namely a local search method and a perturbation method. Most of the current ILS models are formulated by matching different combinations of components manually. This paper proposes a method to automatically design the ILS by utilizing a reinforcement learning (RL) technique, for solving the software modularization problem. More specifically, Q-learning is used to guide the proposed method in selecting the proper components during different stages of the optimization process. To demonstrate the applicability of the proposed algorithm, eleven software systems are selected. The experimental results show that the proposed algorithm produces higher or equal quality modularizations compared with other algorithms.

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SIVD: Dataset of Iranian Vehicles for Real-Time Multi-Camera Video Tracking and Recognition

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Abstract

In this paper, a new publicly available web-Scraped Iranian Vehicle Dataset (SIVD) for simultaneous real-time vehicle tracking and recognition is proposed. The datasets provided for Iranian cars in the literature have two fundamental problems. First, the lack of images from different angles, and second, the small number of classes compared to the dispersion of car models in the real world. Therefore, for the purposes of this paper, Iranian vehicle images from car sales websites are collected, and the SIVD dataset is proposed which contains 29 classes and 36,705 images. This paper aims at developing a classification network for Iranian vehicle recognition and implement a real-time tracking system using the YOLOv5 network to perform real-time vehicle model recognition and tracking tasks simultaneously. The ResNet50 achieved an accuracy of 99.29%, the highest among the investigated classification networks.

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A Near-Optimal Deep Detector for BER Minimization in an OFDM AF Relay System

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Abstract

This paper investigates a Near-Optimal Deep Learning (DL)-based detector for an Orthogonal Frequency Division Multiplexing (OFDM) Amplify and Forward (AF) relay system. The main goal of the proposed DL detector is to achieve the best Bit Error Rate (BER) performance by a low-complexity Deep Neural Network (DNN). A pre-processing stage based on the frequency domain is applied before entering the input data into DNN. Since the performance of the model is very sensitive to tuning the parameters, simulation results compare the BER performance for different scenarios to obtain an accurate model. Finally, we show that the desired model is close to the Maximum Likelihood (ML) as an optimal detector

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The Effects of Data Augmentation Methods on the Performance of Human Activity Recognition

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Abstract

In recent developments of Human Activity Recognition systems (HAR), researchers have focused on deep structures, especially convolutional neural networks integrated with long short-term memory cells such as convolutional LSTM (ConvLSTM) networks. The deep structures require large datasets which demand extensive data collection. Therefore, various data augmentation methods are under focus nowadays. Furthermore, the challenge of time-series data augmentation is to choose the method that preserves the correct labels. In this paper, we evaluated and compared six data augmentation methods (i.e., autoencoder, time warping, amplitude warping, scaling, jittering, and linear combination) utilizing ConvLSTM networks for classification. Consequently, the WISDM dataset (tri-axial accelerometer signals of six activities) was augmented to the final size of 1.5 times the original dataset. Further, the proposed ConvLSTM model was trained seven times (once with the raw dataset and six times with the augmented dataset). The results indicated classification accuracy improvements for the test data from 92% to 93%, 97% and 98%, when training the models using augmented datasets, augmented using linear combination, scaling, and jittering methods respectively. Activity-wise analysis suggested the stairing activities to be the most challenging for the model to classify when the dataset was augmented by time warping, amplitude warping as well as autoencoder.

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Video-based Person Re-Identification Using Attention Based on Separation Index

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Abstract

Re-identifying people from a video is a biometric task for identifying an individual from a long distance. RGB images are used to represent a person in each frame in appearance-based approaches. Furthermore, RGB images contain gait features and other visual clues which can be recognized. Hence, these approaches are not invariant to changes in clothing and baggage. Skeleton-based approaches are alternatives to appearance-based methods. These methods are invariant to view changes. In this experiment, a skeleton-based method is developed to employ pose information in situations where videos of individuals vary in view. First, extracted features by an EfficientNet-b7 were divided into 1, 2 and 4 parts. By utilizing pose information, a Graph Neural Network (GNN) has been constructed. The GNN captures the intrinsic relationship between these regional features. A new attention mechanism by Separation Index (SI) proposed to weight feature maps. This method is evaluated and achieved 96.63% and 88.67% top-1 accuracy on the most frequently used datasets, PRID2011 and iLIDS-VID.

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SS4IoT: Secure Search Over Encrypted Outsourced IoT Data

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Abstract

The Internet of Things (IoT) is becoming increasingly popular, with estimates suggesting that by 2050, more than 100 billion devices will have the ability to connect to the Internet. Since sensor data makes up the majority of the IoT's data, it is necessary to have large data handling capabilities. Sensor data might be unreliable due to measurement limitations, data update delays, and/or the requirement to protect data privacy. As a result, maintaining the privacy of data acquired from IoT devices that are sent to the cloud for analysis and storage is a major concern. Homomorphic encryption (HOM) is a potential solution for searching encrypted data stored in the cloud. We propose SS4IoT, a new secure search system for IoT data in the cloud. To encrypt data provided by data owners, we employ homomorphic and order-preserving encryption (OPE). Our solution aims at protecting the dataset's privacy while also improving the efficiency of querying encrypted datasets. We also show the capacity of our approach to protect data and query privacy, as well as assess its effectiveness.

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Comparison of Machine Learning Methods for Cryptocurrency Price Prediction

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Abstract

In recent years, cryptocurrencies have received much attention due to their recent price surge and crash. In fact, their prices have been volatile, making them very difficult to predict. Accordingly, various machine learning methods have been used by researchers to investigate factors that affect cryptocurrencies' prices and the patterns behind their fluctuations. From various machine learning and deep learning methods, this study aims to find an efficient and accurate model for predicting Bitcoin, Ethereum, and Binance Coin prices. Our experiments show that the Ridge regression model outperforms more complicated prediction models, such as RNNs and LSTM, in predicting the exact closing price. On the other hand, LSTM can anticipate the direction of the cryptocurrency price better than others

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Fusion BASED AGV Robot Navigation Solution Comparative Analysis and Vrep Simulation

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Abstract

Today, Automated Guided Vehicle (AGV) robots are integral to many factories. One of the basic problems of these robots is accurate navigation, which, in addition to creating security in performing tasks, it helps the robot to manage the battery power and energy and move on a predetermined path. Over the various method, the visions are based on good performance, recently been widely used. In this research, a simple but effective fusion method as the combination of vision(camera) and infrared (IR) sensors with the minimum number of sensors is proposed and implemented. The proposed method has been simulated and evaluated using the Vrep simulator with real dimensions of our previous design AGV system named Hongma and the Python API. In the simulation, the proposed method was carried out. In the experiment, five paths named Circle, Elliptical, Spiral, 8 shapes, and Special path, different paths with different complexity were tested, and the experiment aimed to find the maximum speed at which the proposed algorithm and the vision sensor (camera sensors) can track the path with a 100% success rate. The results obtained in the experiment show the fusion method's effectiveness over the five mentioned scenarios in tracking the planned path compared to the routine vision method.

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Cloud Resource Demand Prediction to Achieve Efficient Resource Provisioning

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Abstract

Cloud computing is a paradigm that uses techniques such as virtualization, time sharing and distributed computing to provide a wide range of hardware and software services for users based on a pay-as-you-go model, on-demand and via ubiquitous network access. Available cloud resources such as compute, network and storage are often scarce, and cloud providers must apply and distribute resources within the boundaries of the cloud environment meanwhile meet the needs of cloud applications. One of the most critical components of the cloud computing architecture is resource allocation, where its efficiency directly affects the performance of the entire cloud environment. Resource allocation in cloud faces major challenges including cost efficiency, response time, reallocation, computational performance, and scheduling tasks. The goal of consumers of cloud computing services is to perform tasks at the lowest possible cost. Cloud providers promote high resource utilization to maximize profits while users pursue the opposite goal which is to reduce the cost without compromising the quality of delivered services. There are various strategies to balance resource allocation and resource cost. In this article, we survey different scheduling algorithms and resource allocation approaches in the cloud computing environment, which include the prediction of resource requests in virtual machines and optimal allocation of resources to reduce costs and increase efficiency.

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A Meta Heuristic Approach for Trajectory Segmentation of Moving Objects

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Abstract

Segmentation plays an important role in discovering knowledge from trajectory data of moving objects. The size as well as the input rate of trajectory data have been drastically increased as a result of extended capability of location-aware devices. Although the existing methods can meet the challenge to some extent utilizing heuristic methods, more effective methods are still needed. Considering the capabilities of genetic algorithm, in this paper we introduce the description of trajectory segmentation problem in the context of genetic algorithm. A segment of points is regarded as a chromosome while the points are considered as genes. We represent trajectory segmentation as an optimization problem and then introduce heuristic methods to solve it using genetic algorithm. The objective function is defined in the context of trajectory segmentation of moving objects where the proposed algorithms provide optimal solutions fulfilling the efficiency as well as the quality requirements in terms of a summarized (compact) trajectory representation.

The results of experimental evaluations on the two data sets – Geolife and Hurricane – show that our proposed algorithms, SEGA, not only outperform existing baseline methods in terms of efficiency but they also result in a more summarized description of trajectories while keeping the quality of the segments.

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A comparative study of machine learning techniques for stock price prediction

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Abstract

Stock price prediction has garnered significant interest among researchers and investors. Machine learning has shown great potential to produce accurate forecasts in the past few years. This paper has applied several machine learning techniques to develop a valid forecast consisting of linear models and various artificial neural networks. We have tested our models on the daily EURUSD pair dataset from the foreign exchange market and the daily S&P 500 dataset from the US stock market. Lastly, we have generated a fair comparison between different models and defined best practices for each domain. Our results indicate the efficiency of the linear models on the EURUSD dataset. Moreover, although deep neural networks have the best performance in predicting the exact price of the S&P 500, we found out that the ARIMA model can forecast the direction of the stock price better than any other model.

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Adaptive Block Compressive Sensing–Based Image Compression: A Comprehensive Mini Review

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Abstract

With the ever-increasing growth of data in the digital world, data storage and transmission has become an important issue. One of the ways to deal with this problem is to pre-process of data before storing and sending them. Compressive Sensing (CS) is a pre-processing technique. In CS, compression is done during the signal sampling process. Image compression is one of the applications of CS. However, in conventional CS-based image compression methods, sampling is performed for the entire image at once, which increases processing time and reduces visual quality. For this reason, block CS (BCS) technique is introduced, in which the image is first partitioned into blocks, and then CS is applied separately to each block. This, increasing the processing speed and decreasing the processing time. To improve quality of the BCS reconstructed image, adaptive BCS (ABCS) is introduced. In ABCS, unlike the BCS, where the CS measurements are fixed for all of the blocks, the measurements are allocated to the blocks based on the attributes of the blocks. In this study, while introducing the CS, BCS, and ABCS techniques, we have a brief review on the ABCS-based techniques in image compression.

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Anomaly Detection In IoT Networks Using Hybrid Method Based On PCA-XGBoost

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Abstract

The Internet of Things is a growing network of limited and heterogeneous nodes and objects connected to the World Wide Web despite tits local connection. With the increasing use of IoT infrastructure in various fields, threats and attacks on these infrastructures are also growing. In this regard, security plays an important role in these networks. Therefore, in this paper, a method based on a combination of Principal Component Analysis (PCA) and XGBoost algorithms for anomaly detection in IoT was presented. For this purpose, after normalizing the data, the PCA algorithm was used to reduce the dimensions and then, the XGBoost algorithm was used to train and classify the proposed model. Finally, the proposed method was evaluated with Machine learning (ML) algorithms including Logistic regression (LR), K-Nearest Neighbors (KNN), Support Vector Machine (SVM), Decision Tree (DT) and was compared using the UNSW-NB15 dataset. The results confirmed performance improvement and superiority of the proposed method.

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Speech Watermarking Based on the Combination of Frequency QIM and Convolutional Coding

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Abstract

The frequent manipulation of speech information introduces an increasing copyright protection demand in the speech signal processing area. In this paper, we propose a blind speech watermarking method based on the combination of frequency Quantization Index Modulation (QIM) and convolutional coding to enhance the robustness and watermarked speech quality. In the proposed approach, the input text message is transformed into a bitstream, then its convolutional encoded version is embedded into the frequency spectrum of the host speech signal with respect to the frame energy and the Human Auditory System (HAS). The detection process is performed on the frame that its energy is higher than a predefined threshold. The detected bitstream is then convolutionally decoded to obtain the watermarked message. The experimental results show that the proposed approach performs more robust against common signal processing attacks than the baseline methods. Furthermore, it can achieve more speech quality.

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Traffic Captioning:Deep Learning-based Methodto Understand and Describe Traffic Images

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Abstract

The world around us is full of pictures. Although it seems easy for humans to compress much visual information, it isstill a problem for computer systems with low output accuracy. Inthis paper, a method is introduced to convert traffic images into their descriptions. The presented description is grounded on prominent objects from images with deep learning models and includes three fundamental ways. First, data processing is performed on training images. Second, functional features are extracted by two deep neural networks named EfficientNet and InceptionV3. Finally, two neural networks, Gated Recurrent Unitand Transformer, are used to convert image features into text. Eventually, the optimal solution will be introduced, significantly increasing the quality of the output sentences. The MS-COCO dataset is used to evaluate the proposed methods. For this purpose,a subset including 8000 images and ten classes of traffic objects inthe MS-COCO dataset are used and pre-processed. The accuracy of proposed model using BLEU evaluation is 66.9%.

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Detection of Chromosomes in Metaphase Images Using Segmentation Techniques

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Abstract

The process of identifying chromosomes in metaphase images is demanding and it takes a lot of time. Thus, chromosome detection correctly in metaphase images is very important. It is proven that deep learning methods have been effective in object detection. Using a deep learning network**,** an automatic chromosome detection model is constructed for metaphase chromosome images. The model learns the chromosome images at the pixel level in less time. The detection results of the network verify the positive role of the model**.** This model of automatic chromosome detection based on deep learning methods may speed up the process of detecting anomalies.

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Chaotic Modified Binary Grey Wolf Optimizer Feature Selection method for Drug-Target interaction prediction Based on drug-protein Features

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Abstract

Drug-Target interaction prediction is a vital stage in drug development, in which there are lots of methods. Experimental methods that identify these relationships based on clinical remedies are time-taking, costly, laborious, complex, and with a lot of challenges. One of the new methods is computational methods. The development of new computational methods, which are more accurate, is better than the experimental methods in the aspect of cost and time. In this paper, to predict drug-target interaction, a new computational model is proposed that from the sequence of proteins information, different features such as PseAAC, PsePSSM, and drugs fingerprint information would be extracted, and then, these features are combined. In the next step, due to a large number of features, the Chaotic MB-GWO (Chaotic Modified Binary Grey Wolf Optimizer) algorithm has been applied for feature selection. The final selected features are given to k-nearest neighbors (KNN) classification to predict the efficiency of this method. The accuracy of the (KNN) classifier on the golden standard datasets (Enzyme, ion channels (IC), G-protein-coupled receptors (GPCR), nuclear receptors (NR)) after feature selection is as follows: 97.18%, 97.71%, 95.47%, and 93.05%. Referring to the results of experiments, this suggested method has an acceptable rate of drug-target interaction prediction and is compatible with the proposed methods in other papers.

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Reduce Cogging Torque in a Brushless DC Motor Via Multi-Objective Optimization

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Abstract

Due to the negative effect of the cogging torque on the Brushless Direct Current (BLDC) motors performance such as the noise and vibration, the cogging torque reducing is became an important issue in design of BLDC motors. On the other hand, the most of methods used to reduce cogging torque have an effect on the output torque. Therefore, the purpose of this research is to reduce cogging torque without having a significant effect on the output torque. Multi-objective optimization is a reliable approach to achieve the desired aim which reduce the cogging torque with respect to the value of output torque. In this paper, the Multi Objective Simulated Annealing (MOSA), Multi Objective Particle Swarm Optimization (MOPSO) and Multi Objective Red Deer Algorithm (MORDA), which are well-known optimization method, is employed to obtain the optimal design of a BLDC motor. Simulation results display that in all optimization algorithms used, the cogging torque is significantly reduced while the output torque is increased.

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Abnormal Behavior Detection in Electronic-Exam Videos Using BeatGAN

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Abstract

Abnormal Behavior Detection is a core ability to recognize cheating in electronic exams (e-exams), especially in the scenes where a fraudulent candidate hides unauthorized resources from the view of the proctor. This work utilizes the BeatGAN algorithm to detect behavioral abnormalities in the skeleton-based motion information of candidates during remote e-exams. We examine the algorithm on the previously published dataset of skeleton features extracted from e-exam videos. The results show that BeatGAN outperforms previously investigated algorithms in sequence anomaly detection using the raw joint-coordinate, implicit bone-length-and-angle and explicit bone-length feature types. But, in event anomaly detection, BeatGAN does not improve the state-of-the-art results on the dataset.

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Presenting a hybrid method based on dark/bright channel, fuzzy and luminance mapping estimation for color image enhancement

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Abstract

The lighting conditions in the environment are not favorable for imaging, and the problem of light is one of the challenges of imaging in the environment. The lack of sufficient light in the images reduces the quality and details of recognition by humans. In this paper, a hybrid method for image enhancement in low light is proposed. At first, dark/bright channel algorithm based on low light images is used for minimum/maximum brightness images. In the next step, the fuzzy algorithm is used to weight different levels of brightness, and finally, the brightness mapping estimation method called LIME is used along with a denoising method to improve the image. To evaluate the proposed method, the Universal Image Quality Index (UQI) indices were used, and the results obtained on the base images show that our proposed method performs is better than the other novel methods.

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Parameter Tuning of Discontinues Lyapunov Based Controller Based on the Gray Wolf Optimization Algorithm Applied to a Robotic Manipulator

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Abstract

This study investigates designing a controller that can be implemented into the nonlinear 2 Degree of Freedom (2-DOF) robotic arm. In order to reveal the effectiveness and robustness of a controller, Proportional Integral Derivative with gravity compensation controller, and discontinuous Lyapunov-based controller have been utilized, and compared. The gain tunning of the controllers has been carried out using two meta-heuristic methods: Grey Wolf Optimization (GWO) and Grasshopper Optimization Algorithm (GOA). Results of the simulations demonstrate that the Discontinuous Lyapunov-Based controller tuned by GWO, provides more accurate results. Evaluations of Integral Absolute Error (IAE) and Integral Absolute Change in Control Output (IACCO) have been used to study the manipulator's performance during the simulations.

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Detecting the drone by the combination of optical flow with various techniques

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Abstract

In image processing, detecting and tracking air targets (especially drones) is attainable. The present study focuses on drone detection using the combination of optical flow and histogram and presents a new approach to the recognition of flying targets (drones). Drones are mostly occupying a small portion of the visual field and are often moving in front of complex backgrounds such as buildings, crowded scenes, and local motion of the trees and leaves. In our work, video images obtained from YOUTUBE were used for considering these motions. Videos were transformed into N-frame by free video-to-jpg converter software. Then, the drone boundary was determined with MATLAB software in the images containing the drone. Eventually, these pictures and drone-free pictures were applied as a database. In this work, four approaches were introduced: 1) combining the histogram of oriented gradient (HOG) and support vector machine (SVM), 2) combining the optical flow (OPF) with segmentation, histogram of oriented gradient (HOG), and support vector machine (SVM) without background elimination, 3) combining the optical flow (OPF) method, image segmentation, histogram of oriented gradient (HOG), support vector machine (SVM), and background elimination by K-means procedure, 4) combining the optical flow (OPF) method, image segmentation, histogram of oriented gradient (HOG), support vector machine (SVM), convolutional neural network (CNN), and background elimination by K-means procedure. Simulation outcomes demonstrated that the proposed procedures have acceptable performance in detecting one or several drones on the scene.

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Optimizing GoogleNet using New Connections and Auxiliary Layers Information

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Abstract

GoogLeNet is a convolutional neural network developed by researchers at Google for image processing. In this study, we have optimized the GoogLeNet model. We divided inception blocks into two types of blocks and established new connections to improve the model accuracy. We created new links between the SoftMax layers to reduce information loss. These changes help us improve recognition accuracy. We compared the updated model performance with state-of-the-art architectures GoogLeNet, ResNet, and AlexNet on the CIFAR-10 dataset and achieved the best classification accuracy.

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Predicting Bitcoin Fluctuations Using Deep Neural Networks

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Abstract

Bitcoin as a decentralized cryptocurrency is the most popular cryptocurrency in the world today. Such that, a lot of people know it as a way to invest their money, which shows that is vital to predict the price trend of this cryptocurrency. In this article, we are trying to predict the price of Bitcoin using a machine learning approach. To do so, we apply collected data from trading sources to train an artificial deep neural network model, and then use the model to predict Bitcoin fluctuation. Our deep model results show that it achieves the best performance among other methods.

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A Robust Pedestrian Detection Approach for Autonomous Vehicles

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Abstract

Nowadays, utilizing Advanced Driver-Assistance Systems (ADAS) has absorbed a huge interest as a potential solution for reducing road traffic issues. Despite recent technological advances in such systems, there are still many inquiries that need to be overcome. For instance, ADAS requires accurate and real-time detection of pedestrians in various driving scenarios. To solve the mentioned problem, this paper aims to fine-tune the YOLOv5s framework for handling pedestrian detection challenges on the real-world instances of Caltech pedestrian dataset. We also introduce a developed toolbox for preparing training and test data and annotations of Caltech pedestrian dataset into the format recognizable by YOLOv5. Experimental results of utilizing our approach show that the mean Average Precision (mAP) of our fine-tuned model for pedestrian detection task is more than 91 percent when performing at the highest rate of 70 FPS. Moreover, the experiments on the Caltech pedestrian dataset samples have verified that our proposed approach is an effective and accurate method for pedestrian detection and can outperform other existing methodologies.

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Clustering-Based Anonymization Technique using Agglomerative Hierarchical Clustering

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Abstract

Privacy protection has emerged as one of the most attractive research topics in recent years. Today; with the rapid growth of social networks (SNs), the rate of users' data collection has increased. Users' sensitive information of collected data should be protected from adversaries. One of the most commonly used privacy protection techniques is data anonymization. Data anonymization is achieved by changing or deleting some information. By applying all three commonly accepted constraints; K-anonymity, L-diversity, and T-closeness; we introduced a data anonymization strategy based on agglomerative hierarchical clustering to preserve anonymized data from identity disclosure, attribute disclosure, and similarity attacks. The simulation result over the dataset of two popular SNs illustrates the effectiveness of the proposed algorithm.

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Smart short-term electric load forecasting considering the Covid-19 epidemic impact based on deep learning

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Abstract

Short-term load forecasting is essential for the power company's operation and grid operators because it is necessary to ensure adequate capacity and proper power generation arrangement; this will affect operating efficiency and short-term decisions. Meanwhile, the Covid-19 epidemic as a nonlinear factor will be effective in short-term load forecasting and based on previous solutions, electrical load forecasting may not be accurate. A nonlinear and complex relationship between the factors affecting the load forecasting problem explains the need to use intelligent methods such as machine learning. This paper analyses the effect of Covid-19 epidemic countermeasures on short-term electric load forecasting in Iran. To forecast the short-term electrical load, a deep neural network with a hybrid architecture and peak power consumption data, average temperature, and Covid-19 epidemic countermeasure data over 15 months during the Covid-19 epidemic was used. The results indicate an increase in forecasting accuracy considering the countermeasure's data. Also, the proposed model validation with data related to the fourth wave of the Covid-19 epidemic and the data of countermeasures modeling in Iran show the effectiveness and reasonable accuracy of the proposed model during the Covid-19 epidemic.

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Phase Shift Design for Intelligent Reflecting Surfaces under Practical Reflection Models in NOMA Network

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Abstract

Intelligent reflecting surface (IRS) with wireless channel reconfiguration capability has been proposed as a promising technology to improve the performance of future wireless networks. IRS is able to achieve massive connectivity, as well as high energy and spectral efficiency with the aid of non-orthogonal multiple access (NOMA) technique. However, IRS in practical systems faces serious challenges such as discrete phase shift configuration, the dependence of reflection amplitude on phase shift, as well as dependence on incident and reflection angles. Hence, we consider a downlink NOMA system assisted by an IRS under practical reflection models and maximize the sum rate by optimizing the IRS phase shift configuration. Since the corresponding optimization problem is non-convex, two exhaustive search and genetic algorithm methods are used to solve the problem. Simulation results show that increasing the number of IRS elements improves the sum rate, and on the contrary, significantly increases the problem-solving time in the exhaustive search method and makes it inefficient. In comparison the genetic algorithm is able to effectively solve the problem in less time than the exhaustive search method. Moreover, a simple but efficient phase aligning algorithm is also proposed in single-user case as a suboptimal solution of problem.

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A feature selection method using slime mould optimization algorithm in order to diagnose plant leaf diseases

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Abstract

One of the most influential factors in the reduction of agricultural products is diseases in plants. In the meantime, every year, apple trees suffer huge losses in terms of plant diseases, and the yield of their product decreases. Therefore, the study of the identification of apple leaf diseases is of great importance. The use of machine vision and machine learning algorithms have greatly helped pathologists in this field. Accurate identification of effective features such as color, texture, and shape in the diagnosis of plant diseases in the processing of images taken from the diseased plant plays an important role in the classification of disease groups. In this study, a new optimized method named slime mould optimization algorithm and SVM classifier were combined to diagnose three apple tree diseases, i.e., black spot, black rot or frog eye leaf spot, and cedar rust. The results obtained in this method provided 12 effective features out of 159 features extracted from disease images, and the accuracy of disease classification was 96.21%.

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The introduction of an autoregressive Kalman filter for estimating Well logging data

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Abstract

Traditional Kalman filters (KF) rely strongly on former knowledge of the possibility of unstable processes and noise consideration statistics. Inadequate priority filter statistics decrease the accuracy and precision of the estimated modes or cause bias in the estimation. Adaptive KF according to the autoregressive (AR) predictor model, in this article, is proposed for well-logging analysis. One of the primary devices for well-logging is natural gamma-ray (NGT), which finds out the fluctuation in natural radioactive emitting from the concentration of three elements (Potassium (K), Thorium (Th), and Uranium (U)). The data are obtained from the computer and the NGT tools are shown in a combination with the energy level of the concentration of these substances in diverse depths. Conventional methods have uncertainties in estimating gamma rays received from the radioactive energy level to assess the reservoir. To cope with this problem, the adaptive KF base on AR is offered and proposed. However, the result is improved in comparison with KF. By applying the optimal AR method, the result is better and improved.

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Methods of identifying unauthorized customers in cryptocurrency mining of distribution networks-a review

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Abstract

This paper reviews the methods to identify unauthorized cryptocurrency mining customers in distribution networks. Hence, various methods and models were compared. Also, the research conducted in the field of cryptocurrencies was evaluated in the four categories of energy, pollution, theft, and mining.

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Image Processing for Recognition of Digital Elements in HDL Code Generation

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Abstract

Engineering drawings, including hand written-based or computer-based, are frequently utilized; across various industries such as electronic, mechanical, oil, and gas. Extracting, recognizing, and interpreting a circuit can provide easier debugging and further information. This paper proposes a new method to identify primary gates and their connected lines in electrical circuits to generate hardware description languages (HDLs), automatically. This method comprises three main phases. First, applying morphological and logical/arithmetic operations eliminate all lines except gates. Second, the resulted image including logical gates is examined to recognize primary gates using an object detector. For this purpose, the proposed method recognizes all objects using connected component technique and graph theory. According to the shape feature, the type of gate is identified. Finally, a cost-free model is suggested for detecting input and output lines for each gate. Then, the recognized gates and elements in the circuit are used to generate an HDL code. Experimental results verify the promising accuracy of the proposed method.

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Analysing the Impact of Time Delays on the Performance of Geothermal Power Plant Integrated Multi Area Hydro-Thermal Power System

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Abstract

This paper focuses on revealing the impact of the realistic non-linear parameter that is time delays (TDs) on the frequency stability of a multi-area system. A geothermal power plant (GTPP) integrated hydro-thermal system is taken up for analysis and carried out the analysis with a step load perturbation (SLP) of 10% on area-1. PID plus double derivative (DD) gain (PIDD) using water cycle algorithm (WCA) is presented as a secondary regulator. The efficacy of PIDD is showcased with those of PI and PID. The prominance of TDs on the frequency stability is revealed in investigating GTPP integrated multi-area power systems without and with considering TDs.

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Profile face recognition based on elements by normalizing global and local features

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Abstract

Despite recent advances in face recognition using deep learning, pose changes are still one of the challenging problems. In this paper, we presented a method to normalize the image in the feature space by capturing local consistency during training. we used facial elements such as eyes, lips, nose, and hairstyle in addition to its general state for recognition. For this purpose, all the elements were detected and localized by semantic segmentation and then normalized. Specifically, an Attention-based convolutional neural network is introduced to integrate local features with their long-range dependencies yielding better feature representations and hence generate representation that preserves identities better, especially for larger pose angles. We used the face/head segmentation dataset for training and the FERET dataset for testing, and the results were good for images with the most difficult angular conditions. The performance of this model on the +90° images of the FERET dataset for 980 samples was 49.6% compared to VGGFace which was only 2.6% accurate.

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Deep Multi-scale Dilated Convolution Neural Network with Attention Mechanism: A Novel Method for Earthquake Magnitude Classification

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Abstract

The magnitude of an earthquake influencesthe amount of damage and casualties it causes in any society. Although reliable and timely prediction of magnitude earthquakes can help reduce damage, it requires advanced algorithms to extract relevant information fromraw seismic data. Because of its high strength in betterrepresentation of features, Convolutional Neural Network (CNN) has demonstrated success in earthquake predictionamong deep learning algorithms. The features of different received fields obtained by various sizes of convolution kernels can give comprehensive seismic information. Conventional CNN uses a one-size convolution kernel to learn complete information from complex inputs. Furthermore, conventional CNNs have a limited capacity to learn local and global features simultaneously.To address the issues above, we suggested a novel strategy based on a multi-scale dilated convolutional neural network with an attention mechanism (MSDCA). While the multi-scale module automatically obtains the rich features of different time scales,the attention mechanism decides the weight of distinct scales, improving the model's dynamic adjustment performance and adaptable capacity. The purpose of this study is to classify the magnitude of Himalayan earthquakes into different categories based on their importance. The outcomes and comparisons with state-of-the-art techniques demonstrate the proposed method's superiority.

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Optimization Methods Can Increase the Durability of Smart Electrochemical Biosensors

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Abstract

Biosensors are devices equipped with bioreceptors for specific and selective detection of various analytes. They work generally based on either redox or inhibition reactions. Due to the fact that the activity of the bioreceptor immobilized on the working electrode of electrochemical biosensors reduces over time, it should be replaced frequently, resulting in undesirable effects on costs and commercialization of biosensors. In this research, machine learning was used as the decision-making unit of an electrochemical nitrate biosensor considering electrochemical data, pH of the samples, and enzyme activity decrement due to its lifespan and storage temperature. Genetic algorithm (GA), particle swarm optimization (PSO), Harris hawks optimization (HHO), and whale optimization algorithm (WOA) were used to optimize the parameters of artificial neural networks (ANNs) and support vector machine (SVM) to predict nitrate concentration. The findings showed that WOA-ANN and GA-SVM resulted in a promising performance with coefficients of determination (R^2) equal to 0.93 and 0.91, respectively, even three weeks after the enzyme immobilization. Comparing the results of the present study and those of former works on the development of smart biosensors revealed the importance of improving the performance of smart biosensors by using metaheuristic optimization methods.

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A Supervised Deep Learning-based Approach for Bilingual Arabic and Persian Spell Correction

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Abstract

Spell Correction is a widely referred problem in natural language processing. Since spelling errors prevent perfect transmission of the author's intended concepts to the audience, writers and researchers usually spend a lot of time reviewing, to detect and correct spelling errors in their writings. Therefore, an automatic tool would be a great help in this area. Persian language is very prone to these errors due to its unique features. Also, the introduction of Arabic sentences and terms into this language has increased the challenges in spelling correction. Thus, there is a need for a tool that can detect and correct spelling errors in bilingual Persian and Arabic content. In this work, a supervised deep learning-based approach is proposed which benefits from a conditional random field (CRF) recurrent neural network to correct bilingual Arabic and Persian spelling errors. In order to create a suitable data set for training and testing the model presented in the proposed approach, 220,000 sentences with Arabic and Persian content were taken. Then artificially and using the methods of producing correct and error pairs, spelling errors were generated. In the next step, using the neural network based on the conditional random field, a model was presented that takes the features extracted from the data set as input to the network and makes predictions. The design of these features is one of the important points in this type of implementation. The results of the evaluations show that the proposed approach has a good and acceptable accuracy as the first bilingual Arabic and Persian Spell Corrector.

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Considering User Interests to Provid an Event Base News Stream Framework

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Abstract

With the wide spread use of social networks, news, as the most important product of online media, has a significant effect in creating news streams and guiding public opinion. By creating a news stream, news agencies sensitize people's minds to a specific issue. One of the most important components of creating a news stream is generating and recommending the appropriate text. In this article, we use the fine-tuned GPT-2 model based on a deep neural network to generate text related to the target topic. We also recommend the generated text to users using recommender systems. In this research, the performance of the system was evaluated using the dataset collected from a Persian question-and-answer (Q&A) social network. The test results indicate that the relevance of the generated text to the topic by the fine-tuned GPT-2 model, has increased by 4% compared to the basic model.

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Optimal Routing between Sensors-Actuators in Smart Grids Using Linear Matrix Inequalities

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Abstract

The rapid advancement of smart grid technology has led to large number of distributed sensors and actuators in the network that require methods for solve problems such as stability, reliability and more. Since the sensors and actuators are generally not located in one place, a communication network is needed to transmit the system observations from the sensors to the actuators. Thus, the design of the communication subsystem is of key importance for the stabilization of system dynamics in smart grids. In this research, first, the smart grid as the cyber physical system is modeled in the state space, and then the gain matrix, which represents the connection between the sensors and the actuators, is directly obtained by using an LMI. The simulation results for a DG voltage control system confirm that the proposed method is methodical (i.e., does not require pre-configured routing) and is high speed compared to similar methods, which is effective to stabilize large scale cyber-physical systems.

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An intelligent method for detecting weather conditions using deep learning on a combined dataset

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Abstract

Identifying weather conditions, such as snow, rain, fog, and dust, can be very beneficial in safety and security concerns, and plays a prominent role in transportation, driving and many daily activities. Taking advantage of the abundance of surveillance cameras in the city and remarkable advances in Deep Neural Networks (DNN) for image classification, we have developed a DNN model for more reliable weather prediction. In the proposed model, transfer learning and fine-tuning techniques are used for EfficientNet-B0 and EfficientNet-B4 convolutional neural networks (CNN), and two models ResNet-50 and ResNet-101 with transfer learning are given for comparison. The proposed model is evaluated on our constructed combined dataset, which is composed of five different datasets and includes five weather conditions: rain, snow, fog, cloud, and fine dust. Mislabeling has been reduced in the combined dataset. The proposed EfficientNet-B4 model obtains the best results with 94.79% accuracy comparing with ResNet-101 with 90.42% accuracy at most. Additionally, the proposed model achieved a high accuracy of about 99% on the Kaggle and DAWM-MCWCD dataset, which is superior comparing with the previous studies.

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similarity-based approach for seed selection in diffusion model

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Abstract

Following the invention of the Internet and its expansion among all the people of the world, many software products, sites, games, and even hardware was presented by scientists, programmers, and manufacturers, whose use today is one of the essential and irreplaceable needs. It has become part of people's daily lives. Along with all the ways and means of using the Internet, social networks also spread among people with great power and speed. Today, most people are familiar with social networks and use them differently according to their needs. One of the ways to spread information is using social networks. Through social networks, many users can be informed about information such as news, advertisement, and many other things. This diffusion of information among users has been investigated by the problem of influence maximization to provide a solution to spread the diffusion in the social network. JACCIM algorithm, after detecting communities and selecting candidate nodes from overlapping and non-overlapping nodes based on topology criteria including Jaccard coefficient, has selected a set of k nodes. This collection has been able to maximize the diffusion of information in the network. With experiments on the proposed algorithm, comparing it with some other algorithms, and checking the results, the proposed algorithm has shown a significant impact on its execution time.

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An Artificial Neural Network Based Ensemble Model for Predicting Antigenic Variants: Application of Reduced Amino Acid Alphabets and Word2Vec

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Abstract

Assessment of antigenic similarity between strains of the influenza virus is a crucial factor when planning vaccine compositions. To perform this, a gold-standard laboratory procedure, hemagglutination inhibition assay, is conventionally used. Despite its theoretical importance and accuracy, this procedure suffers from several shortcomings, including high time consumption. Therefore, various computer-aided and mathematical methods have been developed to acquire earlier knowledge on the antigenic characteristics of currently circulating viruses. In this paper, we introduce a state-of-the-art ensemble artificial neural network model based on features derived from multi-representation of antigenicity. Generally, each feature is generated from an optimized convolutional neural network whose input describes the genetic difference between viruses in a specific numerical space. The space is determined based on embedding of the genetic sequence by a reduced amino acid alphabet and the Word2Vec framework. Our experiments indicated that the proposed model outperformed approaches from the literature by achieving an accuracy level of 0.933 for the H1N1 subtype. This implies possible application of our model as a promising exploratory tool in practical tasks of virus control.

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Automatic Separation of Effective Frames in the Analysis of Voluminous Videos Using Human-Object Interactions

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Abstract

In recent years, machine learning algorithms and deep neural networks have provided very suitable answers to solve complex problems, including the analysis of human-object relationships in videos, but one of the main problems in the operational use of these algorithms is the time-consuming processing, Especially in bulky videos. In this research, a dynamic approach is presented by combining the use of deep neural networks along with scene evaluation function with different coefficients, during which the people and objects present in the scene are identified and the effective changes are investigated, focusing on the origin of the changes. In this method, the changes of the different parts of the body are checked separately and with different coefficients. The importance of this matter is that many of the changes in the scene are not related to human-object interactions and a significant part of the processing time in the usual methods is devoted to the investigation of these changes. In this situation, most ineffective frames in the main process of the video are automatically detected and excess frames are discarded even with changes in some areas such as the background or neutral objects. The results show that this method, while reducing frames and summarizing videos with human-object relationships, helps to use deep learning algorithms for online processing of these videos.

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Investigating the differences between atrial fibrillation and normal ECG signals using the EMD method

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Abstract

this paper presents the application of empirical mode decomposition (EMD) for analyzing electrocardiograph (ECG) signals and detecting Atrial Fibrillation (AF) cases. EMD generates a limited and small number of Intrinsic Mode Functions (IMFs). The decomposition is based on the direct extraction of components related to various intrinsic time scales. In this paper, analytic functions corresponding to IMFs are obtained using the Hilbert transform. Using a Central Tendency Measure (CTM), the radius of a circle in which 95% of analytic function points are located within the circle is determined. ECG signals like other biological signals are generally non-stationary. Although traditional processing tools such as short-time Fourier or wavelet transforms are applied for studying biological signals, they are unable to probe completely the ECG signals. EMD is used as a proper technique for analyzing and decomposing non-stationary data. The area of this circle in the complex plane has been used as a feature in order to categorize normal ECG signals from the AF ECG signals. Our results indicate that the area criterion of IMFs in the complex plane in the normal cases are greater than those of the AF cases. In this way, the proposed method can be effective in differentiating the ECG signals of normal subjects and cases with AF.

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A Fuzzy Controller Design for a Stem-Vibration Strawberry Harvester Robot

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Abstract

Recent studies have shown the acceptable performance of robotic solutions as reliable techniques in agricultural fields. Robotic fruit shakers contain planar mechanisms with a high degree of freedom. This research involved the performance evaluation of several conventional controllers, as well as a fuzzy controller, in controlling the vibration of a strawberry fruit-stem system using a five-degree-of-freedom air-suspension stem-vibration (ASSV) mechanism. The displacement and angular velocity of strawberry fruit, as the last arm of the mechanism, is studied during the experiments. Simulation results revealed that compared to optimal, high-passed filter, and low-passed filter controllers, an intelligent controller based on the fuzzy inference system resulted in more appropriate performance with appropriate settling time and maximum overshoot of the study state variables.

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Data-Driven Model Predictive Control for Load-Frequency Control in Islanded Microgrids

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Abstract

One of the basic issues of microgrids is frequency and power control in a separate state from the power grid. In this article, the data-based predictive control method is presented for the first time in a microgrid in order to control the load frequency. By applying the control signal to the sources and positioning the proposed controller in the secondary loop of frequency control, frequency disturbances are detected after microgrid power changes. In fact, the designed controller first provides a model of the system based on the Subspace System Identification method, and then, based on the obtained model, based on the appropriate dynamic logic, it directs the control system in alignment with the goals of the system. The proposed method was implemented for the first time in a standard microgrid without considering the dynamic model associated with the targeted system, and in addition to achieving the control goals, i.e., load frequency control, it was also able to repel disturbances well.

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Evaluating Keyphrase Extraction Methods for Clustering Influenza-Related Scientific Papers

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Abstract

The number of annual scientific publications is growing year by year, which has led to the accumulation and formation of large databases. This increases the complexity of the search for relevant articles. Modern search engines leverage keyphrases to improve the performance of search results. Keyphrases (or keywords) are a set of single or multi-word expressions which provide a very compact summary of contents and describe the overall topic of a document. Implementation of keyphrase extraction can be varied for specific-domain databases. This motivated us to evaluate these methods on a database of influenza scientific literature. In this work, we considered 9 well known methods for extracting keyphrases. Our preliminary results show that graph-based methods which employ topics outperform others using our database. We also determined that influenza-related papers can be grouped into three general topics: public health & medical care; molecular biology & immunology; and phylogenetic & epidemiological studies

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Radio Frequency Fingerprint Identification of Drones Based on Variational Mode Decomposition

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Abstract

Recent technological advances have made drones one of the most popular unmanned vehicles for commercial and noncommercial uses. However, there are challenging concerns about their malicious uses. This issue shows the necessity of using a drone detection and identification system with high accuracy and range. In this research, we introduce a drone detection and identification system using fingerprint Identification of radio frequency(RF) signals of drones. Firstly, the drone signal is detected using an energy detector. Then, the RF signal variational mode decomposition (VMD) is calculated. In the following, high-order statistical features are extracted from VMD band-limited modes. The classification process has been applied using directed acyclic graph SVM (DAGSVM). According to the results, the proposed method can detect and identify different drone types with 93% and 86% accuracy for standard and practical datasets, respectively.

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Adaptive Frame Selection In Two Dimensional Convolutional Neural Network Action Recognition

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Abstract

We presented a technique in this research for dynamic frame selection to achieve robust features. This situation results in less redundancy and useful input for the network. Because it uses fewer processing resources and offers adequate accuracy, the suggested technique is appropriate for real-time applications. The network becomes more efficient and maintains adequate accuracy when informative frames are chosen and computation is minimized. The framework is tested on UCF101 as one of the large and realistic datasets. The experiments show acceptable results employing both Resnet-50 and Mobilenet pre-trained features.

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A Heuristic-based Approach for Improvement the Performance of Probabilistic AODV Routing Algorithms in MANETS

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Abstract

Mobile Ad hoc NETworks (MANET) are infrastructure less networks that are mostly used in emergency situations where the base station is damaged. The most important application of such networks is in the military and more especially for search and rescue (SAR) applications. Therefore, it is important to investigate the effective parameters on the performance of such networks. In this paper, we focus on the probabilistic Ad hoc on-demand Distance Vector (AODV) routing algorithm which is a common routing algorithm in MANETs. Because of the importance of improving network performance and preventing collision, therefore in this paper, we propose an intelligent probabilistic method to improve the network's performance by increasing the throughput and decreasing the average end to end delay. The proposed method is evaluated for probabilistic AODV by defining a probability density function (PDF) depending on factors such as network density, probability of forwarding the messages, and mobility using a cuckoo optimization evolutionary algorithm to find out the best probability of forwarding in order to maximize a cost function depending on throughput and average end-to-end delay. The simulation results are provided using NS2 simulator.

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On linearization of the product of two continuous variables

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Abstract

Linearization of nonlinear functions is a common strategy that researchers use in many practical optimization problems due to existence of more powerful linear programming algorithms. In this note, an approximate technique for linearizing the polynomial term obtained by multiplying two continuous variables is studied. A constructive demonstration of the linearization technique is presented in detail which helps to show that the previously claimed upper bound on its error of approximation is incorrect and may therefore lead to solutions that are not accurate enough. Furthermore, to prevent misuse of the mentioned technique, we determine the best upper bound on its error of approximation.

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Multi-label detection of ophthalmic disorders using InceptionResNetV2 on multiple datasets

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Abstract

Recently, AI-based methods have been extensively used to help in the process of diagnosing eye diseases due to their prevalence. But since these methods can't be generalized well, they can't be used in the real world. In this paper, we compared the two fundamental approaches for improving the model's performance on the eye disease detection task. The idea is that, for real-world applications, using multiple datasets for robustness is more beneficial than enhancing the architecture just to increase the accuracy. To demonstrate this, we chose three state-of-the-art architectures as our baseline and changed them slightly so that the overfitting wouldn't happen. For the first approach, we change the classification head to XGB and SVM, and for the second approach, we combine the two datasets for the training stage. The results show that high-quality data with representative distribution can have a better effect than sophisticated architecture for real-world applications. This approach performed 3% better than the last state-of-the-art model. The implementation is available at "https://gitlab.com/asiyeh.bahaloo/eye-disease"

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A Pattern Recognition Framework for Signal Processing in Metaverse

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Abstract

Recognizing emotions in Metaverse and the real world at the same time is a significant issue that is less addressed today and is very attractive to many psychologists. In this paper, using a simple machine learning (ML) network called echo state network (ESN), speech emotion recognition (SER) has been done in both the Metaverse and the real world. Due to the recursive structure of the reservoir used in ESNs, they will have limitations for modeling high-dimensional data (because of high memory consumption). In this paper, a new structure is presented to empower ESNs for high-dimensional signal processing. To reduce the complexity caused by hyper-complex data, an octonion-based nonlinear ESN (ONESN) has been proposed. In addition, two different scenarios are designed and analyzed for how to demonstrate the functionality of the proposed networks.

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Deep Self-Organizing Maps for Visual Classification

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Abstract

In this paper, we propose a deep self-organizing map algorithm that consists of parallel layers of self-organizing map and sampling. The self-organizing layer has certain numbers of self-organizing maps, with each map only looking at a local region on its input. The winning neuron from every self-organizing map in the layer is then organized in the sampling layer to generate an image which could then be fed to the next self-organizing layer. To analyze the effectiveness of the proposed deep self-organizing maps, we apply it for visual classification. The visual classification of deep self-organizing maps is evaluated using the following visual data exploration methodologies: 1) U-matrix, 2) hit-maps, and 3) class label distribution. Compared to traditional self-organizing map single-layer networks, results demonstrate that deep selforganizing maps produce more accurate visual representations of the distribution of the data.

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An Accelerated Coordinate Descent Method for Support Vector Machine

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Abstract

Support vector machines (SVMs) are famous and important classifiers in classification researches. SVM and its application have been used in an enormous amount of research in various scientific domains in recent years. There are different methods to solve SVM problems. Coordinate descent methods are one of the main categories of methods for solving these problems. In this paper, using the generalization of Aitken's $\Delta 2$ process to the vector case, a new accelerated coordinate descent algorithm is proposed. The new algorithm is tested with three different datasets. The numerical results indicate the efficiency of the new algorithm in the concept of increasing the speed of convergence.

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تشخیص افتادن در ویدیوهای حاصل از تک دوربین: روشی مبتنی بر الگوریتم های تقویت کننده با توزیع کلاس های نامتوازن

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چکیده

تفکیک و شناخت فعالیت های انسانی توسط سامانه های هوشمند از مسایل مهم حوزه ی سلامت هوشمند است که در سالیان اخیر توجه محققان بسیاری را به خود جلب کرده است. در میان تمام فعالیت ها، افتادن از اهمیت ویژه ای برخوردار است چرا که یک رویداد خطرناک برای گروه سالمندان به حساب می‌آید. در حوزه ی مراقبت تصویری، سامانه های مبتنی بر یک دوربین به دلیل پیچیدگی کمتر و ارزان تر بودن جایگاه ویژه ای دارند و با این حال چالش هایی مانند نامتوازن بودن توزیع داده ها از عوامل محدود کننده ی این سامانه ها می‌باشند. این مقاله رویکردی مبتنی بر یادگیری ماشین را برای تشخیص افتادن با استفاده از تصاویر یک دوربین های ارائه می دهد که در آن تشخیص افتادن با استفاده از تشخیص اسکلت انسان و متعاقبا استفاده از طبقه بند تقویتی آدابوست، صورت می‌پذیرد. ارزیابی عملکرد روش پیشنهادی بر روی یک مجموعه ی داده گان معتبر و مقایسه ی نتایج با روش های کلاسیک موجود بر حسب سنجه های دقت، حساسیت و اختصاصی بودن حاکی از آن است که روش پیشنهادی می‌تواند به عنوان یک گزینه ی کارامد و با کیفیت بهتر نسبت به اغلب روش های موجود در سامانه های تشخیص افتادن که معمولا تعداد داده های مربوط به حالت افتادن کمتر از تعداد داده های وضع طبیعی است، مورد استفاده قرار گیرد.

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دسته‌بندی بدافزارها براساس تحلیل تصویری داده‌های دودویی

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چکیده

بدافزارها از چالش‌های همیشگی دنیای مدرن محسوب می‌شوند که به دلیل رشد روزافزون و پیچیده‌تر شدن سازوکار مخربشان، ابزارها و روش‌های فعلی کارایی و سرعت کافی برای مقابله با حجم بسیار تهدیدات را ندارند. به تصویر کشیدن محتوای دودویی داده‌ها به‌صورت تصاویر سیاه‌وسفید و جستجوی عوامل مخرب از بین الگوهای تصویری مشکوک، ازجمله روش‌های نوین محسوب می‌شود که در سال‌های گذشته به لطف الگوریتم‌های یادگیری عمیق به پیشرفت و کارایی بالایی دست پیداکرده است. بااین‌حال در این پژوهش نشان داده شده است که می‌توان بدون نیاز به آموزش‌های پیچیده و تنها با به‌کارگیری روش‌های سنتی یادگیری ماشین به نتایج مطلوب دست یافت. الگوریتم پیشنهادی نه‌تنها ازلحاظ زمان و توان پردازشی موردنیاز بهینه‌تر است، بلکه توانسته نتایج مربوط به مجموعه داده‌های رایجی همچون Malimg و مایکروسافت را به ترتیب با دقت ۹۹,۷۲ و ۹۹,۱۶ درصد پشت سر بگذارد.

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استراتژی خرید و فروش در بازار بورس ایران بر اساس روش های یادگیری ماشین

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چکیده

در سال های اخیر مردم بیشتر به سمت بورس و بازار های مالی روی أورده اند، ولی درصد زیادی از آن‌ها بدون مطالعه وارد دنیای بورس شده و با ضرر و زیان بالایی از آن خارج می‌شوند. در این مقاله تلاش شده است با روش های یادگیری ماشین سیگنال‌های خرید و فروش دریافت شود و نتایج در برخی مدل‌ها دقت مناسب را برای برخی سهم‌ها نشان می‌دهد که درصد خوبی در بازار بورس می‌باشد؛ زیرا پیش‌بینی آینده در بازار بورس سخت می‌باشد. در این مقاله از سهام صنایع پتروشیمی خلیج فارس و هفت سهم دیگر بازار بورس ایران استفاده شده است، داده های قیمتی استخراج شده و به صورت تعدیل شده تبدیل شده و برچسب گذاری به صورت باینری انجام گرفته است. سپس با الگوهای شمعی و اندیکاتور ها، ویژگی های جدید استخراج شده است و سپس با روش های یادگیری ماشین مانند ..., SVM ,XGBOOST,KNN , RFداده ها آموزش دیده اند و توسط معیار های ارزیابی معروف و ماتریس تداخل مورد سنجش قرار گرفته‌اند.

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بازشناسی احساسات از سیگنال گفتار در زبان فارسی مبتنی بر روشهای یادگیری ماشین سنتی و نوین

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چکیده

گفتار یکی از اصلی‌ترین راه‌های بیان احساسات است. علی‌رغم انجام پژوهش‌های زیاد در حوزه بازشناسی احساس از گفتار، چالش‌ها و مشکلات حل‌نشده‌ای وجود دارند. دقت در انتخاب ویژگی‌های بهینه، کاهش ابعاد بردار ویژگی‌ها، انتخاب دسته‌بند مناسب و جمع‌آوری دادگان همواره مورد توجه پژوهشگران بوده است. در این مقاله زبان فارسی و آلمانی به عنوان زبان هدف انتخاب شده و مجموعه دادگان احساسی PERSIAN ESD، SHEMO و EMO مورد بررسی قرار گرفته‌اند. در ابتدای کار از دسته‌بندهای ماشین بردار پشتیبان و کا-نزدیکترین همسایه با انتخاب ویژگی‌های عروضی و طیفی مناسب مبتنی بر الگوریتم‌های تحلیل مولفه‌ی اصلی و حذف بازگشتی ویژگی‌ها استفاده شده است. سپس، از دسته‌بندهای نوین چون، شبکه‌های عصبی عمیق و شبکه‌های عصبی پیچشی برای دسته¬بندی هفت احساس پایه استفاده شده است. تمامی نتایج حاصل با مطالعات انجام شده مورد مقایسه قرار گرفتند و شاهد افزایش میزان دقت در بازشناسی احساسات بودیم. بهترین نتایج را از میان دسته‌بندهای سنتی، ماشین بردار پشتیبان با رویکرد حذف بازگشتی ویژگی‌ها بر روی دادگان PERSIAN ESD با دقت ۹۵,۷۲ درصد کسب کرده است.

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بررسی اثر توامان داده‌افزایی و یادگیری انتقالی در بهبود عملکرد یادگیری عمیق در تشخیص سرطان پستان به کمک ترموگرام ها

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چکیده

سرطان پستان، یکی از علت های اصلی مرگ و میر زنان در میان کشورهای در حال توسعه و توسعه نیافته است. تشخیص و طبقه‌بندی به موقع سرطان پستان در مراحل ابتدایی رشد آن به بیمار امکان درمان مناسب را می‌دهد. تصویربرداری ترموگرافی به عنوان ابزاری مؤثر برای تشخیص زود هنگام سرطان پستان است. تحقیقات در این زمینه نشان داده است که روش‌های یادگیری عمیق نسبت به روش‌های سنتی یادگیری ماشین به نتایج بهتری در طبقه‌بندی تصاویر ترموگرافی منجر می‌شود؛ اما متأسفانه وابستگی شدید عملکرد روش های یادگیری عمیق به تعداد نمونه‌های آموزشی معمولا به عنوان یک عامل بازدارنده در این حوزه ظاهر شده است. از سوی دیگر با توجه به نوین بودن این زمینه ی پژوهشی، هنوز مجموعه داده های بزرگی برای تشخیص سرطان با استفاده از ترموگرام ها وجود ندارند که این موضوع استفاده از روش های تکمیلی را اجتناب ناپذیر می سازد. در این مقاله، برای بهبود مدل و رفع چالش کمبود داده در تشخیص سرطان پستان از روی ترموگرام ها از ترکیب یادگیری انتقالی و اعمال داده افزایی بر روی بانک داده ی معروف DMR-IR استفاده شده و عملکرد شبکه های عصبی با و بدون استفاده از این ترکیب، آزموده و مقایسه می شود. نتایج به دست آمده حاکی از آن هستند که استفاده از مدل یادگیری انتقالی Resnet 152 روی این مجموعه داده گان به دقت ۸۳٪ در تشخیص سرطان پستان رسیده است و این در حالی است که پس از داده افزایی دقت همین سناریو به ۸۸٪ افزایش یافته است.

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استفاده از الگوریتم حداقل میانگین مربعات با اندازه گام متغیر جدید و کم‌هزینه برای کاهش نویز سیگنال الکتروکاردیوگرام

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چکیده

از آنجا که سیگنال‌های الکتروکاردیوگرام (ECGدر حین جمع‌آوری داده‌ها توسط نویزهای مختلفی آلوده می‌شوند، حذف نویزها فرآیند مهمی در تشخیص صحیح بیماری‌های قلبی تلقی می‌شود. از رایج‌ترین روش‌های کاهش تداخلات ECG، استفاده از فیلترهای تطبیقی مبتنی بر روش حداقل میانگین مربعات (LMSاست، که به محاسبات و توان مصرفی کمتری نیاز دارند و پیاده‌سازی آنها ساده‌تر است. در این مقاله، الگوریتم تطبیقی مبتنی بر حداقل میانگین مربعات با اندازه‌گام متغیر (VSSLMSجدیدی ارائه شده است. در این الگوریتم از علامت خطا برای به روز رسانی اندازه‌گام استفاده شده است و هیچ ضرب‌کننده‌ای بکار نرفته است، که این امر منجر به مقاومت الگوریتم در برابر محیط با نسبت سیگنال به نویز (SNRپایین و کاهش پیچیدگی محاسباتی می‌شود. نتایج ارزیابی الگوریتم با استفاده از پایگاه داده‌های MIT-BIH Arrhythmia وMIT-BIH Noise Stress Test و همچنین بر اساس معیارهای عمکرد MSE، RMSE، PRD و SNR ارائه شده است. با توجه به نتایج شبیه سازی‌ها استنباط شده است که الگوریتم پیشنهادی ضمن نویز زدایی کامل سیگنال‌های ECG، نتایج بهتری را در مقایسه با همتایان خود دارد و به دلیل عملکرد مناسب، سرعت همگرایی بالا و پیچیدگی محاسباتی پایین، قابلیت استفاده در اغلب کاربردها و صنعت را دارد.

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آشکارسازی خطوط در تصاویر متنی فارسی با به‌کارگیری روشی مبتنی بر ساختار نگارش

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چکیده

با پیشرفت تکنولوژی، رویکرد اجرایی سازمان‌ها و ادارات نیز با توجه به نوع فعالیت‌های آن‌ها دچار تغییر شده و به‌سمت استفاده و به‌کارگیری این نوع تکنولوژی‌ها رفته است. یکی از تغییرات بسیار مهم، تغییر در روند اداری شرکت‌ها و حذف کاغذ و الکترونیکی شدن اسناد با هدف حفظ منابع طبیعی بوده است. بدین‌ترتیب نیاز به پردازش حجم بالایی از اسناد اسکن شده شامل متون تایپی و دست‌نویس خواهد بود. استفاده از الگوریتم‌های پردازش تصویر، با هدف بازگردانی این اطلاعات به اسناد کامپیوتری و طبقه‌بندی و جستجو در آن‌ها یکی از موضوعات مورد علاقه بسیاری از پژوهشگران در زمینه بازشناسی است. طبقه‌بندی متون به فرایند برچسب زدن یا تفکیک یک متن درون تصویر در قالب یکی از دسته‌های از پیش‌تعیین‌شده می‌باشد. در پژوهش جاری، به ارائه راهکاری هوشمند و سریع، جهت استخراج خطوط فارسی در متون تایپی اسکن‌شده پرداخته‌ایم. کلیت روش پیشنهادی ارائه‌شده، بر طبق یک الگوریتم دو مرحله‌ای است. در مرحله اول بلوک‌های متنی داخل تصویر با استفاده از یک رویکرد مبتنی بر خوشه‌بندی که با هدف استخراج و تعیین اجزای متصل انجام می‌شود، شناسایی می‌گردند. در مرحله دوم نیز فرایند دسته‌بندی متون به منظور تفکیک خطوط متن بر روی بلوک‌های متنی شناسایی‌شده انجام می‌شود. نتایج تجربی حاصل از به‌کارگیری روش پیشنهادی بر روی دادگان تهیه شده، نشان از کارایی بالای الگوریتم ارائه‌شده در آشکارسازی خطوط بر اساس اندازه قلم‌های گوناگون در یک تصویراسکن‌شده دارد. مجموعه داده جمع‌آوری‌شده شامل تصاویری متنوع از مکتوبات مختلف با قلم‌ها و اندازه قلم‌های متفاوت، است. دقت روش پیشنهادی بر روی این مجموعه داده ۹۹،۸۳ درصد است. علاوه بر دقت بسیار بالایی که روش پیشنهادی در آشکارسازی خطوط دارد، سرعت اجرای بالای الگوریتم از دیگر مزایای آن می‌باشد.

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پیشنهاد روش نوین حذف نویز تکه ای تصاویر SAR برپایه تبدیل موجک

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چکیده

نویز تکه ای براثر انعکاس امواج بر تصاویر ماهواره ای SAR وارد می شود. حذف این نوع نویز برای عملیات های بعدی نظیر قطعه بندی و تشخیص نواحی در پردازش تصویر ضروری است. در این مقاله یک روش جدید برای حذف نویز تکه ای با استفاده از تبدیل موجک پیشنهاد می شود. روش کار به این صورت است که ابتدا از تصویر نویزی تبدیل لگاریتمی گرفته می شود تا نویز ضربی تبدیل به نویز جمع شونده شود و توسط توابع گوسی قابل تخمین باشد. سپس تبدیل موجک بر تصویر نویزی لگاریتمی اعمال شده و باندهای مختلف توسط فیلتر وینر و تخمین ترکیب گوسی، رفع نویز می شوند. درنهایت با اعمال تبدیل معکوس موجک و تابع نمایی، تصویر خروجی بدست می آید. چهار تصویر نمونه از دیتاست Capella Space انتخاب شده است و نتایج با سه روش مرسوم در این زمینه با معیارهای PSNR و SSIM مقایسه شده است. نتایج بدست آمده نشان می دهد که روش پیشنهادی چه از لحاظ کمی و چه از لحاظ کیفی از سایر روش ها برتر است.

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بازیابی ریزدانه‌ای تصویر به کمک شبکه خودتوجهی مکانی و مکانیسم برجسته‌سازی

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چکیده

بازیابی تصاویر، دسته‌بندی دقیق تصاویر، با استفاده از شباهت‌ها و تفاوت‌های موجود در بافت، رنگ، فرم و سایر ویژگی‌های تصویر است. بازیابی تصویر برای پرس‌وجوی مبتنی بر تصویر شامل رویکردهای متفاوتی است که می‌توان آن‌ها را در سه دسته عمده بیان نمود: بازیابی تصویر مبتنی بر طرح، بازیابی تصویر مبتنی بر محتوا و بازیابی تصویر مبتنی بر ریزدانه. در این مقاله شبکه خودتوجهی مکانی پیشنهاد شده‌است که شامل دو جزء اصلی می‌باشد. ابتدا یک شبکه عصبی کانولوشنی به‌عنوان استخراج‌کننده ویژگی پیاده‌سازی می‌شود که ویژگی‌های اولیه را از تصاویر ورودی از طریق چندین لایه کانولوشن استخراج می‌کند. سپس ماژول خودتوجهی مکانی با استفاده از مکانیسم توجه، ویژگی‌های جدید را ذخیره می‌کند. یکی از مشکلات روش استفاده از شبکه خودتوجهی مکانی آن است که تصویر ورودی، با ویژگی‌های با اهمیت کم‌تر بررسی می‌شود و ممکن است بخش‌های حاشیه‌ای در نتیجه نهایی عملکرد شبکه، تأثیرگذار باشند. در این مقاله، روش XRAI برجسته‌سازی پیشنهاد شده‌است. این روش با امتیاز ۸۸ درصد توانسته‌است نتیجه‌ای قابل توجه نسبت به سایر روش‌های بازیابی تصویر داشته‌باشد.

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تشخیص موضع در متون به کمک مدل های یادگیری عمیق

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چکیده

تشخیص موضع بر روی متون مختلف از جمله متون خبری یکی از مسائلی است که در سال¬های اخیر مورد توجه پژوهشگران پردازش زبان‌های طبیعی و هوش مصنوعی قرار گرفته و پژوهش¬های گوناگونی بر روی آن انجام شده است. تشخیص موضع یک متن نسبت به یک ادعا، اولین و مهم ترین قدم در تشخیص اخبار جعلی است. از آنجایی که تشخیص صحیح موضع وابستگی زیادی به معنی متن دارد، باید معنای کلمات در کنار یکدیگر ارزیابی شود تا معنی واقعی جمله مشخص گردد. از این رو، ما در این مقاله یک سیستم هوشمند مبتنی بر یادگیری عمیق مطرح کرده‌ایم که برای بازنمایی معنای کلمات به زمینه هر کلمه توجه می‌کند. در روش پیشنهادی این مقاله، از تعبیه‌ساز ParsBERT برای مدل‌سازی معنایی کلمات با توجه به زمینه استفاده شده و در نهایت یک بردار معنایی به عنوان بازنمایی معنایی متن تولید شده است. این بردار معنایی پس از عبور از یک لایه Dropout به یک لایه تصمیم‌گیری تماماً متصل داده شده تا موضع متن نسبت به ادعا مشخص شود. آزمایشات ما بر روی یک مجموعه‌داده از متون زبان فارسی نشان می‌دهد که روش پیشنهادی توانسته است به مقدار ۷۸٪ برای دقت طبقه‌بندی و مقدار ۶۸٪ برای average F1 دست پیدا کند.

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ارایه یک روش سریع برای دسته‌بندی داده‌ها مبتنی بر خوشه بندی

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چکیده

دسته‌بندی یکی از زیر شاخه های اصلی داده کاوی و یادگیری ماشین است. هدف از دسته‌بندی این است که با استفاده از مجموعه داده‌هایی که وجود دارد مدل مناسبی ارایه شود و سپس بر مبنای مدل ساخته شده داده‌هایی که در آینده شناسایی خواهند شد را به درستی دسته‌بندی کند. در این مقاله ابتدا به تعریف دسته بندی و روش‌های حل آن می‌پردازیم و سپس روش پیشنهادی ارائه می‌شود. در روش پیشنهادی ابتدا داده‌ها خوشه‌بندی می‌شوند سپس داده‌های هر خوشه به کمک ماشین بردارپشتیبان دسته‌بندی می‌شوند. با اجرای روش پیشنهادی روی داده‌های تصادفی نشان می دهد که روش پیشنهادی باعث کاهش مدت زمان آموزش و آزمایش می‌شود.

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