Conference Program

July 20-22, 2020

Seoul, South Korea

MEAMT 2020

2020 4th International Conference on Material Engineering and Advanced Manufacturing Technology

CFAIS 2020

2020 International Conference on Frontiers of Artificial Intelligence and Statistics

ISNCA 2020

2020 International Symposium on Neural Computing and Applications

CLNLP 2020

2020 International Conference on Computational Linguistics and Natural Language Processing

Welcome

Dear Distinguished Participants,

Welcome to 2020 4th International Conference on Material Engineering and Advanced Manufacturing Technology (MEAMT 2020), 2020 International Conference on Frontiers of Artificial Intelligence and Statistics (CFAIS 2020), 2020 International Symposium on Neural Computing and Applications (ISNCA 2020), 2020 International Conference on Computational Linguistics and Natural Language Processing (CLNLP 2020).

Currently, the novel coronavirus COVID-19 is widely spreading in the world. Every countries are now sparing no efforts to fight against the novel coronavirus pandemic and its impact. And we are definitely convinced that under the worldwide people's concerted efforts, the current serious situation will be relieved in the near future! After careful consideration and painstaking preparation, we would like to declare that the July conferences will be held online during July 20-22, 2020.

First of all, we'd like to express our sincere gratitude for your participation, which is the vital note to make the conference a great forum for the collision and fusion of ideas and knowledge. Besides, we'd like to say that the kind help and great efforts offered to our conference by our session chairs Prof.Mu-Chun Wang and Prof. Sergei Gorlatch are greatly appreciated. Meanwhile, we'd like to express our sincere gratitude to our keynote speakers Prof. Chun-Sing Lee, Prof. Benjamin Tsou, Prof. Roberto Navigli and Prof. Sergei Gorlatch who will share their newest and outstanding research achievements in this online conference.

In this big data age, the ever-changing information technology has updated and revolutionized the structure and content of our knowledge. The aim as well as the objective of MEAMT 2020&CFAIS 2020&ISNCA 2020&CLNLP 2020 is to present the latest research and results of Material Engineering and Advanced Manufacturing Technology, Frontiers of Artificial Intelligence and Statistics, Neural Computing and Applications, Computational Linguistics and Natural Language Processing. By providing opportunities for the delegates to exchange new ideas face-to-face, to establish business or research relations as well as to find global partners for future collaborations, we do hope that the conference will intensify mutual improvement and facilitate academic exchange, as a result that leading to significant contributions to the knowledge in these up-to-date scientific fields.

At the same time, we wish you enjoy a very splendid time in this online conference!

Thank you!

MEAMT&CFAIS&ISNCA&CLNLP 2020 Committee

General Information

❖**Time Schedule**

All time arrangement mentioned in this program are based on **Korea Standard Time (KST), UTC +9**.

❖**Remarks**

The online conference is open to participants only. For more detailed information, please kindly refer to the **Webex User Guideline**.

❖**A Polite Request to All Participants**

Participants are requested to join this online conference in a timely fashion. Presenters are reminded that the time slots should be divided fairly and equally by the number of presentations, and that they should not overrun. The session chairs is asked to assume this timekeeping role and to summarize key issues in each topic.

❖**Dress Code:**

Formal or national custom

❖**Certificate**

Certificate of Attendance

A certificate of presentation indicates a presenter's name, affiliation and the paper title that is presented in the scheduled session, certifying the paper has been presented in this online conference.

Certificate of Best Presentation & Best Student Paper & Best Poster

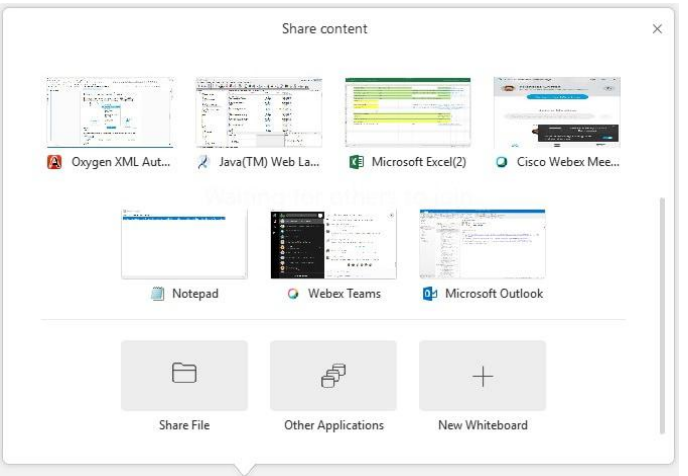
Presenters who presents a great oral presentation or poster presentation will be awarded as the Best Presentation, the Best Student Paper or the Best Poster. The session chair will announce a best awards in the award ceremony on July 21st, 2020.

Certificate Distribution

All presenters will receive the certificate (soft copy) of participation from conference committee through conference email, and the award winner's certificates (soft copy) will also be sent by conference committee through conference email.

❖**Preparation for Oral Presentations**

You are expected to prepare your file in PowerPoint or PDF in advance. We recommend you to bring two copies of the file in case that one fails. You can share content during the online meeting. In the Participants panel, grab the ball and drop it next to your name. You become the presenter. Select Share content and start sharing.



Regular Oral Session:about 15 minutes of Presentation including 2-3 minutes of Q&A.

Program (KST, UTC +9.)

Time Line	Monday 20-July	Tuesday 21-July		Wednesday 22-July
1000-1015		***Opening Ceremony***		
1015-1100		***Keynote Speech -----Prof. Chun-Sing Lee***		
1100-1115		Oral Session	IS002-Asso. Prof. Tzee-Ming Huang	
1115-1130			IS005-Prof. Weide Li	
1130-1215		***Keynote Speech-----Prof. Benjamin Tsou***		
1215-1230		Oral Session	A008-Prof.Mu-Chun Wang	
1230-1400		**Break & Free Discussion**		
1400-1445		***Keynote Speech -----Prof. Roberto Navigli***		
1445-1500		Oral Session	LP031-Sarang Gupta&Kumari Nishu (Student)	
1500-1515			LP021-Hongru Sun (Student)	
1515-1530			LP001-Yuanyuan Shen (Student)	
1530-1545			LP016-Yuanyuan Shen (Student)	
1545-1600	**Software Test**		NC006-Bekkouch Imad Eddine Ibrahim (Student)	
1600-1630		**Break & Poster Session**	A023-Huadong Sun	
			NC007-Hyun Jun Park (Student)	
1630-1700		***Keynote Speech-----Prof. Sergei Gorlatch***		
1700-1715		Oral Session	LP028-Thananya Phreeraphattanakarn (Student)	
1715-1730			LP020-Anita Agustin (Student)	
1730-1745			LP027-Arshad Javeed	
1745-1800			LP015-Asst. Prof. Shahnawaz Khan	
1800-1815			LP032-Maksym Shchoholie (Student)	
1815-1830			A1001-Olga Zudina (Student)	
1830-1845			A1002-Olga Zudina (Student)	
1845-1900			A028-Festus Oluwadare Fameso	
1900-1915			LP019-Dr. Benyamin Ahmadnia	
1915-1930		**Award Ceremony & Closing Ceremony**		
1930-2000				

Keynote Session

Keynote Speech 1

10:15-11:00 Tuesday, July 21st 2020 (KST, UTC +9.)

Title: Nanoparticles of Fluorescent and Photovoltaic Molecules for Biomedical Applications

Prof. Chun-Sing Lee

City University of Hong Kong, Hong Kong

Abstract

Semiconducting molecules often have interesting optical properties suitable for biomedical applications. However, they typically have poor water solubilities and are thus often overlooked. In this talk, a summary will be given on how the solubility issue can be addressed by packaging the hydrophobic molecules into nanoparticles.[1-2] In particular, a newly developed approach of using ice as a template for controlling self-assembly of molecules into nanoparticles will be introduced. [2] Examples will then be given on applications of these nanoparticles for imaging,[3-5], photodynamic therapy (PDT) [5-6] and photothermal therapy (PTT).[7-8]

Introduction to Prof. Chun-Sing Lee

Prof. Chun-Sing Lee obtained his BSc and PhD degrees from the University of Hong Kong in 1987 and 1991 respectively. He then furthered his research career in the University of Birmingham of UK with the support from a Croucher Foundation Fellowship. He joined the faculty of the City University of Hong Kong in 1994 and is currently a Chair Professor of Materials Chemistry and the Head of the Chemistry Department. He also co-founded the Center Of Super-Diamond and Advanced Films (COSDAF) in 1998 and is now the Center's Director. Prof Lee's current research interests include organic electronics devices and nanomaterials for energy, environmental and biomedical applications. In 2016, he established the journal Materials Today Energy with Elsevier and serves as the Editor-in-Chief.

Oral Session

Tuesday, July 21st, 2020	11:00-11:30 (KST, UTC+9.)	Webex

Session Chair: Prof. Mu-Chun Wang & Prof. Sergei Gorlatch

IS002
Asso. Prof. Tzee-Ming Huang
National Chengchi University, Taiwan
15 min

An estimation procedure with knot selection for multivariate regression splines
Tzee-Ming Huang

Knot selection for regression splines is crucial to the approximation power of splines. For univariate splines, many knot selection algorithms are available. However, extending those univariate algorithms to the multivariate case can be challenging. In this work, an estimation procedure with knot selection for multivariate regression splines is proposed, where the knot selection part is adapted from an existing univariate knot selection algorithm. Simulation results are included to demonstrate the performance of the proposed method.

IS005
Prof. Weide Li
School of Mathematics and Statistics, Lanzhou University, China
15 min

SSA-LSTM neural network for hourly PM2.5 concentration prediction in Shenyang, China
Ye Zhang | **Weide Li**

Atmospheric environment has become the focus of global attention. Fine particulate matter has posed a serious threat to human respiratory system. In order to effectively control atmospheric environment and protect human health, pollutant prediction has become a necessary work for human survival and development. In order to improve the accuracy of PM2.5 prediction, this paper developed a new combined prediction model- SSA- LSTM. Firstly, the observed time series are decomposed into periodic component and noise component by SSA (Singular spectrum analysis). Then, LSTM (Long short-term memory) neural network was used to forecast the decomposed components. Finally, the predicted results of different components are integrated to generate the final predicted results. In order to demonstrate the advantage of the established model, choosing Shenyang of China as the research area, we conducted comparative research between the suggested model with three newly used models, LSTM, MLP (Multi-layer perception), and LSTM-FC (Long short-term memory - fully connection). The results show that the proposed model has a significant improvement in the accuracy of prediction.

Keynote Speech 2

11:30-12:15, Tuesday, July 21st 2020 (KST, UTC +9.)

Title: Some Questions on the Lexicon in Future Natural Language Processing

Prof. Benjamin Tsou

City University of Hong Kong

Hong Kong University of Science and Technology

Abstract

Notable recent advances in Natural Language Processing (NLP) have benefited from many spectacular improvements in Machine Learning and its applications in Neural Machine Translation. However there remain certain questions which will continue to challenge on-going and future developments in NLP. These include Out Of Vocabulary (OOV) words which have been baffling and bewildering humans and machines alike, especially in NLP and Machine Translation. They would persist simply because scientific and technological developments have always outpaced developments in lexicography and lexicology. There are two major factors which could contribute to the mounting urgency to cope with the persistent issues: 1) The rapid and unprecedented developments in science and technology and so the accumulations of new knowledge as well as the words to manage it, 2) The concomitant needs to mediate between different linguistic traditions and specialized domains for purposes of global trade and international relations.

In this paper we propose to examine three questions: 1. What may be a practical upper bound on the size of the operational human lexicon which the machine and human speaker could be expected to deal with in some given context? The suggestion has been raised in NLP circles that dynamic processing is more useful than static recovery in the processing of vocabulary (Church 2020). 2. Given the time lag between scientific and technological developments and lexicography, what are some ways, by which we can usefully begin to deal with this problem? 3. We propose to examine some of these issues through the case of the Chinese language and to account for its vocabulary development over a period of 20-years by means of a dynamically maintained Big Database, and also the multiple renditions of old and new technical terms, which have appeared within a 10-year period of accumulated English and Chinese patents.

In the process we hope to touch on not just practical issues in computational linguistics and NLP but also broader issues on the fundamental link between the lexicon and the knowledge base of human beings.

Introduction to Prof. Benjamin Tsou

Benjamin Tsou is Emeritus Chair Professor at the City University of Hong Kong and Adjunct Professor at Hong Kong University of Science and Technology. He worked on machine translation

at M.I.T. in Professor Victor Yngve's Machine Translation Group and later headed the Chinese-English machine translation project at UC Berkeley. He interests have since focused on the rigorous cultivation of quality linguistic data for applications in NLP and digital humanities. In 1995, he began cultivating the pan-Chinese media corpus, LIVAC(https://en.wikipedia.org/wiki/LIVAC_Synchronous_Corpus and in 2019 his group produced a prototype platform (Patentlex (http://patentlex.chilin.hk/) to alleviate lexical gap deficiency problems involving technical terms in NLP applications. It is based on a corpus of 300+K comparable Chinese and English patents curated over more than 10 years. The derived bilingually aligned sentences have been useful for many applicants, including its use in the two pioneering NTCIR Chinese-English patent machine translation competitions held in Tokyo in 2009 and 2010. The further extraction and accumulation of technical terms in the Patentlex platform has won second place in the Game Changer Competition organized by TAUS in Singapore in 2019.

He completed his Master's degree at Harvard University and PhD at UC Berkeley and founded the Research Centre on Language Information Sciences at the City University of Hong Kong and was the founding Chiang Chen Chair Professor of Linguistics and Language Sciences at the Hong Kong Institute of education. He is also the Founding President of the Asian Federation of Natural Language Processing, and an Academician [Académie Royale des Sciences d'Outre-Mer (Belgium)]. His extensive publications are focused on quantitative and qualitative linguistic analysis, and NLP.

Oral Session

Tuesday, July 21st, 2020	**12:15-12:30 (KST, UTC +9.)**	**Webex**

Session Chair: Prof. Mu-Chun Wang & Prof. Sergei Gorlatch

A008
Prof.Mu-Chun Wang
Minghsin University of Science and Technology,

Integrity of N-type Channel Surface for Nano-node High-k Gate Dielectric
Prof.Mu-Chun Wang | Yi-Chun Shen | Tien-Szu Shen | Cheng-Hsun-Tony Chang | Chih-Chieh Chang | Shea-Jue Wang | Wen-How Lan

High-k (HK) gate dielectric in recent stage is tremendously applied to the advanced nano-node integrated circuit (IC) manufacturing. Probing the integrity of n-type channel surface is a meaningful and beneficial task to improve the manufacturing yield. In this work, the different channels of n-channel MOSFETs (MOSFETs) in core of ICs will be focused more, but the gate capacitance integrity in input/output (I/O) zones will also be exposed. Because the stacked consequences of Hf-based gate dielectric between both zones are different, the electrical performances for both are also various. Sensing the driving current, sub-threshold swing, gate oxide capacitance, and

Taiwan **15 min**	interface-state density, we can justify the integrity of channel surface related to the process variation or uniformity concern. According to these electrical characteristics, the shorter channel devices, no matter what the device is located, suffer more damage causing the worse integrity on the channel surface. These possible causes are speculatively the spacer stress or the dry etch in bombardment.

Break & Free Discussion

Tuesday, July 21st, 2020	**12:30-14:00 (KST, UTC +9.)**

Keynote Session

Keynote Speech 3

14:00-14:45,Tuesday, July 21st, 2020 (KST, UTC +9.)

Title: What's new in multilingual sense embeddings, Word Sense Disambiguation and Semantic Role Labeling

Prof. Roberto Navigli

Sapienza University of Rome, Italy

Abstract

Natural Language Processing has seen an explosion of interest in recent years, with many industrial applications relying on key technological developments in the field. However, Natural Language Understanding (NLU) – which requires the machine to get beyond processing strings and involves a deep, semantic level – is particularly challenging due to the pervasive ambiguity of language.

In this talk I will present recent research at the Sapienza NLP group on multilingual NLU, including work on new multilingual sense embeddings, and novel neural approaches to word sense disambiguation and semantic role labeling which scale across languages easily and achieve

state-of-the-art performance thanks to the integration of deep learning and explicit knowledge.

Introduction to Prof. *Roberto Navigli*

Roberto Navigli is Professor of Computer Science at the Sapienza University of Rome, where he heads the Sapienza NLP group. He was awarded two ERC grants in computer science, namely an ERC Starting Grant on multilingual word sense disambiguation (2011-2016) and an ERC Consolidator Grant on multilingual language- and syntax- independent open-text unified representations (2017-2022). He was also a co-PI of a Google Focused Research Award on NLU. In 2015 he received the META prize for groundbreaking work in overcoming language barriers with BabelNet, a project also highlighted in The Guardian and Time magazine, and winner of the Artificial Intelligence Journal prominent paper award 2017. He is the co-founder of Babelscape, a successful spin-off company which enables Natural Language Understanding in dozens of languages.

Oral Session

Tuesday, July 21st, 2020	**14:45-16:00 (KST, UTC +9.)**	**Webex**

Session Chair: Prof. Mu-Chun Wang & Prof. Sergei Gorlatch

LP031
Kumari Nishu
&
Sarang Gupta
(Student)
Columbia University, USA
15 min

Mapping Local News Coverage: Precise location extraction in textual news content using fine-tuned BERT based language model

Sarang Gupta | **Kumari Nishu** | Michael Krisch | Ajay Chainani | Sarah Schmalbach

Mapping local news coverage from textual content is a challenging problem that requires extracting precise location mentions from news articles. While traditional named entity taggers are able to extract geo-political entities and certain non geo-political entities, they cannot recognize precise location mentions such as addresses, streets and intersections that are required to accurately map the news article. We fine-tune a BERT-based language model for achieving high level of granularity in location extraction. We incorporate the model into an end-to-end tool that further geocodes the extracted locations for the broader objective of mapping news coverage.

LP021
Hongru Sun
(Student)
Institute of Automation Chinese Academy of Sciences, China
15 min

Hierarchical Graph Attention Network for Relation Extraction
Hongru Sun | Wancheng Ni | Yiping Yang

Previous research on relation extraction has proved the effectiveness of using dependency trees, which build non-local connections between tokens. However, the existing dependencybased models treat the dependency trees as an inherently flat graph, which causes a loss of dependency information for representing sentences. Besides, they fail to consider the fact that the importance of tokens on the dependency tree varies with different relations to be extracted. In this paper, we propose a novel hierarchical graph attention network HierGAT, which can generate multi-level dependency trees and extract key information from them to improve relation extraction. Specifically, it contains multiple dependency-based graph attention layers, each of which takes a different dependency tree generated by an adaptive subtree pruning strategy as input, and distinguishes the importance of different tokens in a dependency tree. Finally, HierGAT integrates the output token representations of each layer with a multi-head attention mechanism, and learns sentence representation for relation extraction through a pooling layer. The experimental results demonstrate that our method outperforms state-of-the-art baselines on the benchmark datasets.

LP001
Yuanyuan Shen
(Student)
Auckland University of Technology, New Zealand
15 min

The Role of RNNs for Context Representations: A Case Study Using DMN+
Yuanyuan Shen | Edmund M-K Lai | Mahsa Mohaghegh

Recurrent neural networks (RNNs) have been used prevalently to capture long-term dependencies of sequential inputs. In particular, for question answering systems, variants of RNNs, such as Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU), allow the positional, ordering or contextual information to be encoded into latent contextual representations. While applying RNNs for encoding this information is intuitively reasonable, no specific research has been conducted to investigate how effective is their use in such systems when the sequence of sentences is unimportant. In this paper we conduct a case study on the effectiveness of using RNNs to generate context representations using the DMN+ network. Our results based on a three-fact task in the bAbI data set show that sequences of facts in the training data set influence the predictive performance of the trained system. We propose two methods to resolve this problem, one is data augmentation and the other is the optimization of the DMN+ structure by replacing the GRU in the episodic memory module with a non-recurrent operation. The experimental results demonstrate that our proposed solutions can resolve the problem effectively.

LP016
Yuanyuan Shen
(Student)
Auckland University of Technology, New Zealand
15 min

Role of RNNs for Non-sequential tasks in the Question Answering Context

Yuanyuan Shen | Edmund M-K Lai | Mahsa Mohaghegh

Current state-of-the-art neural network-based Question Answering (QA) systems consist of both Recurrent Neural Networks (RNNs) and Feedforward Neural Networks (FFNNs). They generally performed well on 19 of the 20 tasks in the benchmark bAbI data set. The only task that they failed badly is a task involving inductive reasoning where the order of the facts is not important in producing the correct answer. In this paper, we removed the RNNs from DMN+ QA system to form the ff-DMN system. The results demonstrate that ff-DMN improves the accuracy of the induction task significantly. Further experiments reveal that using RNNs is important if intra-sentence reasoning is required while it may adversely affect the performance if inter-sentence reasoning is involved. Finally, by incorporating ff-DMN and DMN+ our ensemble model outperforms the other QA systems on all the 20 tasks.

NC006
Bekkouch Imad Eddine Ibrahim
(Student)
Innopolis University, Pakistan
15 min

VAE-GAN based Zero-shot Outlier Detection

Bekkouch Imad Eddine Ibrahim | Dragoș Constantin Nicolae | Adil Mehmood Khan | Syed Imran Ali | Asad Khattak

Outlier detection is one of the main fields in machine learning and it has been growing rapidly due to its wide range of applications. In the last few years, deep learning-based methods have outperformed machine learning and handcrafted outlier detection techniques, and our method is no different. We present a new twist to generative models which leverages variational autoencoders as a source for uniform distributions which can be used to separate the inliers from the outliers. Both the generative and adversarial parts of the model are used to obtain three main losses (Reconstruction loss, KL-divergence, Discriminative loss) which in return are wrapped with a one-class SVM which is used to make the predictions. We evaluated our method against several data sets both for images and tabular data and it has shown great results for the zero-shot outlier detection problem and was able to easily generalize it for supervised outlier detection tasks on which the performance has increased. For comparison, we evaluated our method against several of the common outlier detection techniques such as DBSCAN-based outlier detection, GMM, K-means and one class SVM directly, and we have outperformed all of them on all data sets.

Break & Poster Session

Tuesday, July 21st, 2020	16:00-16:30 (KST, UTC +9.)
	Poster

Keynote Session

Keynote Speech 4

16:30-17:15 Tuesday, July 21st, 2020 (KST, UTC +9.)

Title: Distributed Software Applications Based on Mobile Cloud and Software-Defined Networks

Prof. Sergei Gorlatch

University of Muenster, Germany

Abstract

We consider an emerging class of challenging software applications called Real-Time Online Interactive Applications (ROIA). ROIA are networked applications connecting a potentially very high number of users who interact with the application and with each other in real time, i.e., a response to a user's action happens virtually immediately. Typical representatives of ROIA are multiplayer online computer games, advanced simulation-based e-learning and serious gaming. All these applications are characterized by high performance and QoS requirements, such as: short response times to user inputs (about 0.1-1.5 s); frequent state updates (up to 100 Hz); large and frequently changing numbers of users in a single application instance (up to tens of thousands simultaneous users). This talk will address two challenging aspects of software for future Internet-based ROIA applications: a) using Mobile Cloud Computing for allowing high application performance when a ROIA application is accessed from multiple mobile devices, and b) managing dynamic QoS requirements of ROIA applications by employing the emerging technology of Software-Defined Networking (SDN).

Introduction to Prof. Sergei Gorlach

Sergei Gorlatch is Full Professor of Computer Science at the University of Muenster (Germany) since 2003. Earlier he was Associate Professor at the Technical University of Berlin, Assistant Professor at the University of Passau, and Humboldt Research Fellow at the Technical University of

Munich, all in Germany. Prof. Gorlatch has more than 200 peer-reviewed publications in renowned international books, journals and conferences. He was principal investigator in several international research and development projects in the field of software for parallel, distributed, Grid and Cloud systems and networking, funded by the European Community and by German national bodies.

Oral Session

Tuesday, July 21st, 2020 **17:15-19:30 (KST, UTC +9.)** **Webex**

Session Chair: Prof. Mu-Chun Wang & Prof. Sergei Gorlatch

LP028
Thananya Phreeraphattanakarn (Student)
Chulalongkorn University
Bangkok, Thailand
15 min

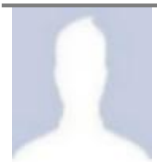
Text Data-Augmentation Using Text Similarity with Manhattan Siamese Long Short-Term Memory for Thai Language
Thananya Phreeraphattanakarn | Boonserm Kijsirikul

In this paper, we address the issue of using small text data sets for learning of neural networks. We explore the method that is used with image and sound data sets to augment data for increasing the performance of models. We then leverage this data augmentation technique to expand the training set of textual data. A great challenge in our data set is that the amount of data is insufficient for training models. For this reason, we propose a method for augmenting text data specifically for Thai language which is based on Text Similarity and using the model to determine the semantic relationship between two sentences. The experimental results indicated that our proposed method is able to improve the performance of text classification.

LP020
Anita Agustin (Student)
Universitas Pendidikan

Indonesian Teachers' Perspective towards the Use of Authentic Materials on Students' Communicative Competence in EFL Classroom
Anita Agustin | Yanty Wirza

In this digital era, learning materials that include adaptation materials like authentic materials occupy a focal place in the success of the EFL teaching and learning context. Thus, teachers have an onus to adapt the teaching materials and do more effort in improving the teaching materials as materials designers, developers, evaluators, and explorers to cater to students' needs for developing students' English ability to achieve the learning goals and curriculum objective. This study investigated how Indonesian secondary teachers viewed authentic materials in EFL classrooms whether they employed

Indonesia, Indonesia **15 min**	authentic materials as one of EFL materials adaptation or considering the importance of real-life authentic language exposure in the 21st-century learning. The data were collected through interview with three English teachers as the participants. The findings indicated that two out of three teachers utilized authentic materials as their main and only sources in their teaching.
 **LP027** **Arshad Javeed** Micro Focus International Plc., India **15 min**	**An LSTM Model for Extracting Hierarchical Relations between Words for better Topic Modeling** **Arshad Javeed** Often when dealing with text data, there exists valuable information that determines the relationship between the words encountered in the corpus. The type of relationship which is sought after is the “has-a” and “is-a” relationship, with which one can build a hierarchical representation of words. Since each language has its own set of rules and syntax, extraction of the relationships ultimately boils down to understanding the syntax of the particular language and using relevant features in the process. The paper presents a machine-learning model for understanding the language syntax and deducing the relationships between the words encountered. To be specific, a sequence modeling approach if followed, where the model receives a sequence of words and makes use of the various properties of the words to build a hierarchical graph. The algorithm described will be independent of the language, and the model should be versatile enough to be trained for different languages. In addition, the paper also describes how this information can be used to build better topic models, given a corpus of text.
 **LP015** **Asst. Prof. Shahnawaz Khan** University College of Bahrain, Bahrain **15 min**	**Chatbot as Islamic Finance Expert (CaIFE): When finance meets Artificial Intelligence** **Shahnawaz Khan** | Mustafa Raza Rabban Artificial intelligence (AI) is the key technology in the new disruptive technological innovation and industrial transformation. AI has very wide application in finance and banking. The financial institutions not only answer the queries of the customers, but they should also clarify the complaints the customer face and provide the solution. For this purpose, many banks and financial institutions are using Chatbot to provide solution to customer complaints and queries. Chatbot are very efficient in providing solution to customers queries and are available 24 hours to give solution to customer's complaints. Finally, we propose an artificial Intelligence based interactive Chatbot called 'Chatbot as Islamic Finance Expert' (CaIFE). Our interactive Chatbot CaIFE receives automatic robot support related to Islamic finance and banking by having users communicate with a robot having knowledge accumulated by machine learning. It answers any query related to Islamic

finance and banking on real time basis. It then presents a case study of CaIFE and explains its characteristics and limitations.

LP032
Maksym Shchoholie
(Student)
National Technical University of Ukraine, Ukraine
15 min

Decision-making and Computational Linguistic Tools Application for Overall Estimation of the Level of Social Tension

Maksym Shchoholie | Oleh Andriichuk | Vitaly Tsyganok | Violeta Tretynyk

The study of social tension, its causes and laws of variation, as well as establishing its level is crucial during crises, epidemics and wars. The purpose of this research is to develop the system for determining the level of tension in society on the basis of data from social networks using decision-making and computational linguistic tools. The impact of various factors on the growth of social tensions is determined with the help of knowledge bases built by means of decision support systems. To analyse the emotionality of comment on news publications the TF-IDF and Word2vec methods are used. Within the framework of the method of target dynamic assessment of alternatives, the level of social tension is determined as the degree of achievement of the main goal, the ratings of news publications and the ratings of news events that contributed to the increase in social tension are calculated. The study presents the efficient method of determining the level of social tension and defining the main factors that have the greatest impact on the growth of social tension. Further studies are needed to improve the estimates of factors and the overall estimate of social tension.

A1001
Olga Zudina
(Student)
Bauman Moscow State Technical University, Russia
15 min

Evaluation of mutations and their various combinations with crossing operators in genetic algorithms

Olga Zudina | Michail Andreiashchenko | Denis Sheronov

The article analyzes the results of using the Geometric Shift and Mikhalevich mutations, as well as combinations of these mutations with arithmetic and fuzzy crosses, respectively, to search for the extremum on the Rosenbrock, Rastrigin, Shekel functions on spaces with dimensions eight and sixteen. The result of the analysis is the conclusion that combinations of mutation and cross operators work differently on different functions both in terms of efficiency and accuracy - these parameters depend on the structural features of the functions and algorithms of the mutation and cross operators.

A1002
Olga Zudina
(Student)
Bauman Moscow State Technical University, Russia
15 min

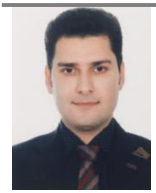
Development of the warehouse planning plan module
Olga Zudina | Dmitriy Kormilitsyn

The planning process is to create a list of priorities for the uncomplete of loads. Priorities are formed on the basis of criteria: the type of cargo and the planned time of completion of the uncomplete. The software module has a connection to the database, which stores information on incoming cargo.

A028
Festus Oluwadare Fameso
Tshwane University of Technology, Pretoria, South Africa
15 min

Coupled explicit-damping simulation of laser shock peening on x12Cr steam turbine blades
Festus Fameso | Dawood Desai | Schalk Kok | Mark Newby | Daniel Glaser

Timeous prevention of, and recovery from, down times due to in-service failure of crucial power plant components, like turbine blades, portends huge consequences in the form of operational and financial viability concerns. Intensive research and development in manufacturing, re-manufacturing and condition-based maintenance of these components have birthed a novel technique, which deploys high intensity lasers to induce compressive residual stresses to the surface of the blades. This paper presents the application of an alternate computational modelling technique in simulating this surface treatment technique on X12Cr steel, an exotic steam turbine blades material, while also investigating the economic parameters of the induced residual stresses. A numerical model is developed in this work using the commercial finite elements software ABAQUS©. The results show this computational modelling technique as being time efficient. The parametric outcomes of the simulation agreedwith experimental results, lending credence to its validity. Induced compressive stresses as high as 700 MPa and depths close to 1 mm from the surface of the blade were obtained. This by indication can prospectively quell crack initiation, growth and unplanned failure of the blade while in service, with the introduced simulation technique offering a solution for timely, non-destructive mechanical integrity enhancement of engineered components.



LP019
Dr. Benyamin Ahmadnia
Tulane University of Louisiana, Iran
15 min

Linked Open Data Effectiveness in Neural Machine Translation
Benyamin Ahmadnia

Quality of data-driven Machine Translation (MT) systems depends on large volumes of data from which models can be constructed to leverage patterns and knowledge from these data sets. In corpus-based MT systems, Out-Of-Vocabulary (OOV) words and ambiguous translations are the most common sources of error. In this paper, JRC-Names and DBpedia have been employed as Linked Data (LD) to minimize the aforementioned types of errors on top of a Neural MT (NMT) model. Three strategies have been evaluated for exploiting knowledge from LD in translating named entities; 1) Dictionaries, 2) Pre-decoding, and 3) Post-editing. Based on the experimental results, these strategies optimize the benefit of the multilingual LD to NMT application. Our experiments on English-Spanish translation as well as English-French translation evaluate the validity of the proposed idea.

Poster Session

Tuesday, July 21st, 2021 **16:00-16:30** **Webex**

A023
Huadong Sun
Shandong Jiaotong University, China

Study on the influence factors of aging property of nano-modified asphalt
Huadong Sun | Ming Yao | Peng Jiang | Yongling Ding | Aiqin Zhang | Baoqun Wang | Hongke Liu

In order to study the aging property of nano-modified asphalt, the values of nano-modified asphalt like softening point, penetration, ductility and viscosity etc. before and after the aging test were measured by controlling the content and types of nanomaterial, and then the relevant aging property indexes were calculated, the aging property optimum of the modified asphalt was determined by scientific methods of mathematical statistics and analysis. The testing results show that nanomaterial can effectively improve the high-temperature stability, low-temperature crack resistance and viscoelasticity of nano-modified asphalt. The content and type of nanomaterial have a great influence on the aging property of modified asphalt, the anti-aging performance of nano-modified asphalt with 0.5% titanium dioxide content is better.

NC007
Hyun Jun Park (student)
Department of Electronic and Electrical Engineering, Sungkyunkwan University (SKKU)
South Korea

Unsupervised learning with dynamic threshold control using LTP and LTD of two-terminal floating gate device

Hyun Jun Park | Woo Jong Yu

Artificial neural networks (ANNs), which mimic biological neural network, have made great progress in SW-x005fbased computation. Because, it has been successful to minimize errors using a large number of input and label pairs. However, in most ANNs, networks cannot be trained enough if there are no labels in inputs and performance degradation is inevitable. Also, it consumes a lot of power in the von Neumann architecture unlike the human brain. Recently, neuromorphic systems have been actively researched to overcome these problems. Here, we propose unsupervised learning with dynamic threshold potential control in spiking neural networks (SNNs). We designed the neural network to deliver spikes from pre-neuron to post-neuron in proportion to the input and mimic membrane potential as device conductance. Weights are implemented in two synaptic devices. We used memristive device conductance model which mimic long-term potentiation (LTP) and long-term depression (LTD) characteristics. Test accuracy is 79.8% in MNIST pattern based on unsupervised learning. The number of used parameters is 784000. This score is highly competitive when converted to accuracy/parameters. Model parameters were used to match two-terminal floating gate devices, which model parameters are α =0.0089 and β =3. We contributed to the accuracy evaluation of unsupervised learning using neuromorphic device conductance model.

Award Ceremony & Closing Ceremony

Tuesday, July 21st, 2020	**19:30-20:00 (KST, UTC +9.)**	**Webex**

www.icotsc.org

www.iscsic.org

www.ccvpr.org

www.jcase.org

www.apcctcm.org

www.iwofr.org