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<tr><td rowspan="5">Project 1</td><td>Full name in English</td><td>FASTATTACKER against Fact VERification</td><td>Start and end time</td><td>01/01/2021</td></tr>
<tr><td></td><td></td><td>Instructor</td><td>Dr. Jin Di</td></tr>
<tr><td></td><td></td><td>Position</td><td>Amazon Alexa AI Applied Scientist II</td></tr>
<tr><td></td><td></td><td>Periodicals</td><td></td></tr>
<tr><td>Project & Process Steps</td><td colspan="3">Cooperating with Doctor Di Jin from Amazon, AI, and writing a paper about the state-of-the-art TADD on fact-checking. In this project, I am mainly responsible for the part realizing the cutting-edge method: FastAttacker, a novel proposed framework on generating adversarial attacks, to attack Fever with baseline Textfooler and BERT-Attack. I employ the state-of-the-art TextAttack method: The experiments aims to validate the weakness of the robustness of the current state-of-the-art TextAttack black-box adversarial models and deal with widespread problems at the moment---factual verification task. In contrast to the greedy-based state-of-the-art TAAD method, Firstly, we generate adversarial texts from different levels of space constraints, which transfer the finding synonym issues into an optimization solution problem. Secondly, compared with two strong baselines, we take two SOTA target models to fulfill the adversarial attacks on the factual verification task. Our method outperforms other SOTA attack strategies in evaluation metrics. The generated adversarial examples are language fluent and semantically preserved. Finally, we show that the attribution results can be further used and explored. Our work fulfills the vacancy of text attack work on factual verification</td></tr>
<tr><td>Role Duties & Contribution & Harvest</td><td colspan="3">1. Propose the novel adversarial attack method FastAttacker, study and design the details of the algorithm.
2. Pre-train BERT model with FEVER datasets
3. Attack BERT model and SOTA Adversarial Attack model—KernelGAT with our framework using FEVER test datasets.
4. Attack target BERT and KernelGAT model with two other baselines—TextFooler and BERT-Attack.
5. Build models and create adversarial text attacks
6. Doing experiments on algorithms
7. Drafted and edited academic paper content</td></tr>
<tr><td rowspan="4">Project 2</td><td>Full name in English</td><td>Automated Disentangled Sequential Recommendation</td><td>Start and end time</td><td>09/01/2021</td></tr>
<tr><td></td><td></td><td>Instructor</td><td>Chengjie Zheng</td></tr>
<tr><td></td><td></td><td>Position</td><td>Umass Boston Doctoral Candidate</td></tr>
<tr><td></td><td></td><td>Periodicals</td><td>IEEE-COMPUTER SOCIETY</td></tr>
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	Project & Process Steps	I am cooperating with Ph.D. Chengjie Zheng from UMB and editing a paper about recommender systems. In our research, we study the problem of automated sequential recommendation through neural architecture search on the attention mechanism. We found the problem that recent sequential recommendation approaches are willing to employ complicated deep structures such as Transformer to capture the sequential patterns more accurately, which heavily rely on hand-crafted designs on key attention components for achieving SOTA performance. For this reason, these approaches fail to automatically obtain the optimal design in various scenarios with different data. To tackle the existing challenges, we propose an automated disentangled sequential recommendation model, which automatically discovers powerful attention representations for the sequential recommendation, capable of extracting multiple user interests in different scenarios through adapting to user-specific intention disentanglement. We employ Neural Architecture Search and design a search space tailored for automated attention representation in the attentive intention-disentangled sequential recommendation, with expressive and efficient space complexity of $O(n^2)$.		
	Role Duties & Contribution & Harvest	1. Improved the recommendation algorithm of seq2seq, adding autoattent on the original basis, which allows the algorithm to automatically modify the parameters of the attention mechanism 2. Processed collected data, found baseline through literature review, and improved accuracy by comparing proposed algorithm with the same dataset 3. Study and finetune the large-scale pre-trained language models with a pre-trained relational graph convolutional network on an item-oriented knowledge graph. 4. Employ task-oriented optimization procedure and generate personalized bridge function with meta-network. Experiment with a novel framework named Personalized Transfer of User Preferences for Cross-domain Recommendation transfer user preference from an auxiliary domain to a target domain. 5. Study and capture users' dynamic interest utilizing Deep reinforcement learning and experiment on novel state-aware experiment replay mode, which recommends the agent with the optimal policy for the online recommendation. Employ locality-sensitive hashing to map high-dimensional data into low-dimensional representations and a prioritized reward-driven strategy to replay more valuable experiences at a higher chance. 6. Drafted and edited academic paper content		
Project 3	**Full name in English**	**Automated machine learning-based radiomics analysis versus deep learning-based classification for thyroid nodule on ultrasound images: a multi-center study**	**Start and end time**	02/01/2022-08/15/2022
			Instructor	Xueyan Mei
			Position	Icahn School of Medicine at Mount Sinai's

				Postdoctoral Researcher
			Periodicals	IEEE-BIBE2022
	Project & Process Steps	Traditionally, the characteristics of thyroid nodules need to be determined by the fine needle aspiration (FNA) biopsy. The increasing applications of machine learning and deep learning algorithms provide alternative noninvasive methods to study thyroid nodules on ultrasound images. Many studies examined the feasibility of convolutional neural networks or radiomics feature extraction to analyze the characteristics of thyroid nodules. In this study, we built an automated radiomics analysis system by combining thyroid segmentation via U-Net and radiomics feature extraction. In this paper, our proposed machine learning- based automated radiomics analysis was compared to a deep learning-based convolutional neural network method in a two- center thyroid nodule classification task. It is shown that the automated radiomics analysis can accurately segment thyroid nodules to facilitate clinical diagnosis by achieving dice scores of 0.77 and 0.74 on internal and external sets respectively. In addition, the proposed automated radiomics analysis approach can improve sensitivity, negative predictive value (NPV) and positive predictive value (PPV) by 352.1%, 3.9% and 187.5% respectively while reducing the false negative rate by 46.6%		
	Role Duties & Contribution & Harvest	1. Collect ultrasound images data from a large scale hospitals. 2. Do Compute Vision work on ultrasound images, transfer the images to 2-Dimensional arrays. 3. Build and train CNN models with the input of 2-D arrays 4. Test the model and do deep learning classification for thyroid nodule 5. Predict the benign and malignant of the thyroid nodule. 6. Drafted and edited academic paper content		
Project 4	**Full name in English**	**Predicting the Compaction Condition of Asphalt Pavement Based on Particle Kinematics An Intelligent Method for Predicting the Compaction Condition of Asphalt Pavement Achieving Smart Compaction of Asphalt Pavement Based on Particle Kinematic Behaviors**	**Start and end time**	05/01/2021–08/01/2022
			Instructor	Shihui Shen
			Position	Associate Professor of the Pennsylvania State University
			Periodicals	
	Project & Process Steps	Asphalt pavement compaction is a process of rearranging asphalt mixture particles by various mechanical means to reduce voids and increase density. Current empirical field compaction methods can sometimes cause compaction problems and reduce pavement durability, particularly when new materials are implemented. This paper aims to develop an innovative compaction monitoring method that determines the density condition of the asphalt pavement based on		

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<tr><td></td><td></td><td colspan="3">particle kinematics. 11 asphalt mixtures with varying mix designs were compacted in the laboratory using a Superpave gyratory compactor (SGC), and two field compaction projects were also carried out. A particle-size wireless sensor, SmartRock, was used to collect the particle kinematic behaviors during compaction. Based on the laboratory compaction data, a machine learning model was established to predict the compaction condition of SGC specimens. In addition, the particle rotation characteristics under gyratory compaction and roller compaction showed a similar trend, which allows using the predictive model developed in the laboratory to estimate the compaction condition of field compaction. The density results from the cores of the two field projects verified the applicability of the intelligent model for compaction prediction. Future studies are recommended to evaluate the model's robustness based on more mixture variety and field applications.</td></tr>
<tr><td></td><td>Role Duties & Contribution & Harvest</td><td colspan="3">1. Collect and prepare data
2. Do data clean work
3. Classification dataset and employed machine learning algorithms
4. Drafted and edited academic paper content</td></tr>
<tr><td rowspan="5">Project 5</td><td>Full name in English</td><td>In progress</td><td>Start and end time</td><td>10,2022</td></tr>
<tr><td></td><td></td><td>Instructor</td><td>Shihui Shen</td></tr>
<tr><td></td><td></td><td>Position</td><td>Professor</td></tr>
<tr><td></td><td></td><td>Periodicals</td><td></td></tr>
<tr><td>Project & Process Steps</td><td colspan="3">1.Do fine-grained algorithms improvement work based on project 4 to achieve better classification outcomes of newly added datasets.
2.Predict the outcome label of which material to use under certain circumstances.</td></tr>
<tr><td>Role Duties & Contribution & Harvest</td><td colspan="3"></td></tr>
<tr><td rowspan="5">Project 6</td><td>Full name in English</td><td>In progress: Bioinformatics</td><td>Start and end time</td><td>2022.9</td></tr>
<tr><td></td><td></td><td>Instructor</td><td>Xueyan Mei</td></tr>
<tr><td></td><td></td><td>Position</td><td>Professor</td></tr>
<tr><td></td><td></td><td>Periodicals</td><td></td></tr>
<tr><td>Project & Process Steps</td><td colspan="3">In last paper, we do computer vision work on patients' ultrasound images with 2-D arrays, which limits the completeness of information about the images and do not make the most use of all the indicators. The currently work on Automated machine learning-based analysis and deep learning-based classification, we will employ 3 dimensional dataset, and use more efficient model</td></tr>
<tr><td>Role Duties &</td><td colspan="3"></td></tr>
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	Contribution & Harvest	