ANSPRO TECHNOLOGIES

IEEE 2018-19 PROJECT LIST

Machine Learning

CODE	TITLE AND ABSTRACT
19ANSP-ML-01	**Eco-Driving Assistance System for a Manual Transmission Bus Based on Machine Learning** ***Abstract-*** Driving assistance systems (DAS) is a key technology to improve fuel economy for in-use vehicles. This also reduces the operational cost of running a fleet of these vehicles, such as city buses. In this paper, we develop a novel white-box evaluation model using machine learning for a manual transmission bus based on previous research about fuel consumption sensitivity to driving style. Using the proposed evaluation model, an algorithm for learning path planning (LPP) for a driving style is also proposed. The LPP method plans a step-by-step shortest learning path for different driving styles to achieve eco-driving, while increasing the driver's acceptance and adaptation of DAS. Simulation results based on vehicle and engine physical models show that the proposed evaluation model, a pure data model, can be used as an alternative to physical model for the eco-driving prompt strategy. The results of the verification show that the proposed strategy can progressively guide the driver to improve the fuel consumption by 6.25% with minimal changes to driver's driving task and driving style.
19ANSP-ML -002	**Deep Learning for Understanding Faces** ***Abstract—*** Recent developments in deep convolutional neural networks (DCNNs) have shown impressive performance improvements on various object detection/recognition problems. This has been made possible due to the availability of large annotated data and a better understanding of the nonlinear mapping between images and class labels, as well as the affordability of powerful graphics processing units (GPUs). These developments in deep learning have also improved the capabilities of machines in understanding faces and automatically executing the tasks of face detection, pose estimation, landmark localization, and face recognition from unconstrained images and videos. In this article, we

	provide an overview of deep-learning methods used for face recognition. We discuss different modules involved in designing an automatic face recognition system and the role of deep learning for each of them. Some open issues regarding DCNNs for face recognition problems are then discussed. This article should prove valuable to scientists, engineers, and end users working in the fields of face recognition, security, visual surveillance, and biometrics.
19ANSP-ML -003	**Using Machine Learning to Detect Fake Identities: Bots vs Humans** ***Abstract*** There are a growing number of people who hold accounts on social media platforms (SMPs) but hide their identity for malicious purposes. Unfortunately, very little research has been done to date to detect fake identities created by humans, especially so on SMPs. In contrast, many examples exist of cases where fake accounts created by bots or computers have been detected successfully using machine learning models. In the case of bots these machine learning models were dependent on employing engineered features, such as the ``friend-to followers' ratio." These features were engineered from attributes, such as ``friend-count" and ``follower-count," which are directly available in the account profiles on SMPs. The research discussed in this paper applies these same engineered features to a set of fake human accounts in the hope of advancing the successful detection of fake identities created by humans on SMPs.
19ANSP-ML -004	**A Movement Decomposition and Machine Learning-Based Fall Detection System Using Wrist Wearable Device** ***Abstract*** Falls in the elderly is a world health problem. Although many fall detection solutions were presented in literature, few of them are wrist-wearable devices, mainly due to typical processing and classification challenges to achieve accuracy greater than 95%. Considering the wrist as a more comfortable, discrete and acceptable place for an elderly wearable device, this paper presents the development and evaluation of a wristworn fall detection solution. Different sensors (accelerometer, gyroscope, and magnetometer), signals (acceleration, velocity, and displacement), and direction components (vertical and nonvertical) were combined and a comprehensive set of thresholds based and machine learning methods were applied in order to define the best approach for fall detection. Data was acquired for fall and non-fall movements from 22 volunteers. For threshold-based methods, a maximum accuracy of

	91.1% was achieved with 95.8% and 86.5% of sensitivity and specificity, respectively, using Madgwick's decomposition. With the same movement decomposition and machine learning methods in the classification stage, an impressive accuracy of 99.0% was achieved, with 100% of sensitivity and 97.9% of specificity in our data set. Prolonged tests with a volunteer wearing the fall detector also demonstrate the advantages of machine learning methods in terms of practical applications.
19ANSP-ML -005	**Performance Comparison of Support Vector Machine, Random Forest, and Extreme Learning Machine for Intrusion Detection** ***Abstract*** Intrusion detection is a fundamental part of security tools, such as adaptive security appliances, intrusion detection systems, intrusion prevention systems, and firewalls. Various intrusion detection techniques are used, but their performance is an issue. Intrusion detection performance depends on accuracy, which needs to improve to decrease false alarms and to increase the detection rate. To resolve concerns on performance, multilayer perceptron, support vector machine (SVM), and other techniques have been used in recent work. Such techniques indicate limitations and are not efficient for use in large data sets, such as system and network data. The intrusion detection system is used in analyzing huge traffic data; thus, an efficient classification technique is necessary to overcome the issue. This problem is considered in this paper. Well-known machine learning techniques, namely, SVM, random forest, and extreme learning machine (ELM) are applied. These techniques are well-known because of their capability in classification. The NSL_knowledge discovery and data mining data set is used, which is considered a benchmark in the evaluation of intrusion detection mechanisms. The results indicate that ELM outperforms other approaches.
19ANSP-ML-006	**An Accurate and Extensible Machine Learning Classifier for Flow-Level Traffic Classification** ***Abstract*** Machine Learning (ML) techniques have been widely applied in recent traffic classification. However, the problems of both discriminator bias and class imbalance decrease the accuracies of ML based traffic classifier. In this paper, we propose an accurate and extensible traffic classifier. Specifically, to address the discriminator bias issue, our classifier is built by making an optimal cascade of binary sub-classifiers, where each binary sub-classifier is trained independently with the

	discriminators used for identifying application specific traffic. Moreover, to balance a training dataset, we apply SMOTE algorithm in generating artificial training samples for minority classes. We evaluate our classifier on two datasets collected from different network border routers. Compared with the previous multi-class traffic classifiers built in one-time training process, our classifier achieves much higher F-Measure and AUC for each application.
19ANSP-ML-007	**SPHA: Smart Personal Health Advisor Based on Deep Analytics** ***Abstract:*** According to a report by the World Health Organization, diseases caused by an unhealthy lifestyle represent the leading cause of death all over the world. Therefore, it is crucial to monitor and avoid users' unhealthy behaviors. Existing health monitoring approaches still face many challenges of limited intelligence due to insufficient healthcare data. Therefore, this article proposes a smart personal health advisor (SPHA) for comprehensive and intelligent health monitoring and guidance. The SPHA monitors both physiological and psychological states of the user. The SPHA Score model is proposed to evaluate the overall health status of the user. Finally, a testbed for verification of feasibility and applicability of the proposed system was developed. The experimental and simulation results have shown that the proposed approach is efficient for proper user state monitoring.
19ANSP-ML-008	**TaxiRec: Recommending Road Clusters to Taxi Drivers Using Ranking-Based Extreme Learning Machines** ***Abstract:*** Utilizing large-scale GPS data to improve taxi services has become a popular research problem in the areas of data mining, intelligent transportation, geographical information systems, and the Internet of Things. In this paper, we utilize a large-scale GPS data set generated by over 7,000 taxis in a period of one month in Nanjing, China, and propose TaxiRec: a framework for evaluating and discovering the passenger-finding potentials of road clusters, which is incorporated into a recommender system for taxi drivers to seek passengers. In TaxiRec, the underlying road network is first segmented into a number of road clusters, a set of features for each road cluster is extracted from real-life data sets, and then a ranking-based extreme learning machine (ELM) model is proposed to evaluate the passenger-finding potential of each road cluster. In addition, TaxiRec can use this model with a training cluster selection algorithm to provide road cluster recommendations

	when taxi trajectory data is incomplete or unavailable. Experimental results demonstrate the feasibility and effectiveness of TaxiRec.
19ANSP-ML-009	**A Machine Learning Framework for Resource Allocation Assisted by Cloud Computing** ***Abstract:*** Conventionally, resource allocation is formulated as an optimization problem and solved online with instantaneous scenario information. Since most resource allocation problems are not convex, the optimal solutions are very difficult to obtain in real time. Lagrangian relaxation or greedy methods are then often employed, which results in performance loss. Therefore, the conventional methods of resource allocation are facing great challenges to meet the ever increasing QoS requirements of users with scarce radio resource. Assisted by cloud computing, a huge amount of historical data on scenarios can be collected for extracting similarities among scenarios using machine learning. Moreover, optimal or near-optimal solutions of historical scenarios can be searched offline and stored in advance. When the measured data of a scenario arrives, the current scenario is compared with historical scenarios to find the most similar one. Then the optimal or near-optimal solution in the most similar historical scenario is adopted to allocate the radio resources for the current scenario. To facilitate the application of new design philosophy, a machine learning framework is proposed for resource allocation assisted by cloud computing. An example of beam allocation in multi-user massive MIMO systems shows that the proposed machine-learning-based resource allocation outperforms conventional methods.
19ANSP-ML-010	**Machine Learning and Deep Learning Methods for Cybersecurity** ***Abstract:*** With the development of the Internet, cyber-attacks are changing rapidly and the cyber security situation is not optimistic. This survey report describes key literature surveys on machine learning (ML) and deep learning (DL) methods for network analysis of intrusion detection and provides a brief tutorial description of each ML/DL method. Papers representing each method were indexed, read, and summarized based on their temporal or thermal correlations. Because data are so important in ML/DL methods, we describe some of the commonly used network datasets used in ML/DL, discuss the challenges of using ML/DL for cybersecurity and provide suggestions for research directions.