Session 2.2 Artificial Intelligence Initiatives

Time & Location: 14:10-15:40, Dec. 1, L009

Chair: Min-Te Sun (孫敏德)

(1) Passenger Flow Prediction Using Weather Data for Taipei Metro Systems

Lijuan Liu (Xiamen University of Technology), Rung-Ching Chen (Chaoyang University of Technology), and Shunzhi Zhu (Xiamen University of Technology)

The Metro system plays an important role in reducing traffic congestion in large cities, but the weather has little special discussion and research on the impact of users on the subway. In this paper, the potential impact of weather on passenger flow, we developed an RNN-based urban passenger flow prediction model, including fusion data, including historical passenger flow data, and corresponding temporal data and weather data. A case study was conducted on passenger flow forecast at Taipei Station. The experimental results verify that adding weather data to construct a passenger flow prediction model can help improve the results.

(2) On the Effect of Data Imbalance for Multi-Label Pedestrian Attribute Recognition

Tsaipei Wang (National Chiao Tung University), Kai-Chen Shu (National Chiao Tung University), Chia-Hao Chang (National Chiao Tung University), and Yi-Fu Chen (Chunghwa Telecom Laboratories)

Pedestrian attribute recognition has many applications in surveillance and attribute based query, tracking, and person re-identification. The recent trend in deep-learning based pedestrian attribute recognition is to use a shared CNN backbone for feature extraction and multiple subsequent branches for the individual branches. While this allows the end-to-end learning to simultaneously recognize multiple attributes, the data imbalance problem of most attributes become a challenge that has not been studied sufficiently for this application. This paper presents studies on how the cost adjustment method, aimed at counter the bias in class distribution, affect several common evaluation metrics. We also propose a two-stage training procedure, where an additional fine-tuning stage on the classifier layers only with class-balanced data is shown to improve recognition performances.

(3) A Fast PM2.5 Forecast Approach Based on Time-Series Data Analysis, Regression and Regularization

Cyuan-Heng Luo (Academia Sinica), Hsuan Yang (National Taiwan Normal University), Li-Pang Huang (Academia Sinica), Sachit Mahajan (Academia Sinica), and Ling-Jyh Chen (Academia Sinica)

The problem of air pollution has become a serious issue in developed as well as developing countries. Unfortunately, most of the current solutions are not very effective and this makes it important to have an efficient early warning system for monitoring and forecasting air quality. Our main focus is to build a real-time forecasting system with high accuracy, and deploy it in Taiwan. In this paper, we propose a forecast method called Adaptive Iterative Forecast (AIF), which can predict the value of PM2.5 for the next few hours (by linear programming, normalization and time-series) based on the trend of historical data. The goal of this research is to develop an efficient and accurate forecast model. Through various comparative analyses, we have proved that our model can achieve significant results. Based on the results, we have also built a real-time forecasting system which allows the users to stay aware of the air quality and plan their day to day life.

(4) A YOLO-based Traffic Counting System

Jia-Ping Lin (National Central University) and Min-Te Sun (National Central University)

Image recognition can be applied in many ap- plications of Intelligent Transportation System (ITS). Through automated traffic flow counting, the traffic information can be presented effectively for a given area. After the existing image recognition model process the monitoring video, the coordinates of objects in each frame can be easily extracted. The

extracted object coordinates are then filtered to obtain the required vehicle coordinates. To achieve the function of vehicle counting, it is necessary to identify the relationship of vehicles in different frames, i.e., whether or not they represent the same vehicle. Al- though the vehicle counting can be achieved by using the tracking algorithm, a short period of recognition failure may cause wrong tracking, which will lead to incorrect traffic counting. In this paper, we propose a system that utilizes the YOLO framework for traffic flow counting. The system architecture consists of three blocks, including the Detector that generates the bounding box of vehicles, the Buffer which stores coordinates of vehicles, and the Counter which is responsible for vehicle counting. The proposed system requires only to utilize simple distance calculations to achieve the purpose of vehicle counting. In addition, by adding checkpoints, the system is able to alleviate the consequence of false detection. The videos from different locations and angles are used to verify and analyze the correctness and overall efficiency of the proposed system, and the results indicate that our system achieves high counting accuracy under the environment with sufficient ambient light.

(5) An Empirical Study of Ladder Network and Multitask Learning on Energy Disaggregation in Taiwan

Fang-Yi Chang (Institute for Information Industry), Chun Chen (National Taiwan University), and Shou-De Lin (National Taiwan University)

Energy disaggregation is a technique of estimation electricity consumption of individual appliance from an aggregated meter. In this paper, we study the ladder network and multitask learning on energy disaggregation using auto-encoder architecture. This auto-encoder architecture was proposed from Kelly and Knottenbelt in their recent research work. We used this auto-encoder architecture to the high-ownership appliances, air conditioner, bottle warmer, fridge, television and washing machine, in Taiwan and evaluated the effectiveness of the ladder network and multitask learning via these five appliances. The experimental dataset has collected by Institute For Information Industry and consists of near 30 different households about a half years. We expect that this project can promote the industrial development of big data-driven smart energy management in Taiwan.