Traffic Information Retrieval and Analysis in Major Events Based on Monitoring Visual Data

Seminar summary

Accurate and prompt traffic data is necessary to the success of large event management. Conventional methods of traffic volume and speed monitoring primarily rely on sensors, on-board GPS, and human observation, which are generally resource-intensive, slow, and subject to implementation limits. Compared to this, computer vision is a more efficient alternative to extract information from the traffic monitoring visual data. This talk presents a framework designed to extract traffic volume counts and intersection turning patterns from cameras on the Texas A&M University (TAMU) campus. Particularly, a convolutional neural network (CNN) object detection model, namely YOLOv5 (You Only Look Once version 5), is integrated with an object tracking algorithm (Deep-SORT) to track vehicles and pedestrians in camera views. These tracks are projected using homography transformation from the pixel coordinate system of the camera onto an orthogonal map (world coordinates) along with information such as unique ID, class, position, and time stamp. Moreover, accuracy influencing factors including lighting condition, camera angle, detection size, traffic volume, and time are studied. This work is a collaboration of the speaker Yalong Pi with Tim Lomax (Texas A&M Transportation Institute), Amir Behzadan (Texas A&M University Department of Construction Science) and Nick Duffield (Texas A&M University Department of Electrical and Computer Engineering and Institute of Data Science). Video data used in this study were provided under agreement by Texas A&M Transportation Services, and analyzed under privacy-preserving protocols approved by the Texas A&M Privacy Officer, Office of General Counsel (OGC), and Institutional Review Board (IRB). This seminar series is co-organized by Department of Landscape Architecture and Urban Planning, Transportation Institute, and Institute of Data Science at Texas A&M University.

Speaker's information

Yalong Pi is a Postdoctoral Data Scientist in the Texas A&M Institute of Data Science (TAMIDS) at Texas A&M University since 2020. During 2013-2016, he worked as a project manager at Gree Real Estate Co Ltd, Zhuhai City, China. He also worked as a junior architect at Shanghai Water&Rock Group in 2017. He obtained a Ph.D. in Architecture from Texas A&M University (2020), a Master's Degree of Civil Engineering (2013) from Wuhan Institute of Technology, and a Bachelor Degree of Mechanical Engineering (2011) from Wuhan Textile University. He is a certified Architectural Engineer in China mainland. His research focuses on machine learning (computer vision) applications in domains including disaster reconnaissance, transportation, construction automation, and building information modeling.

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Direct Link: https://tamu.zoom.us/j/7326410814?pwd=cGZKY045dmVkdzVRLy9MYWhocWorQT09

Faculty Host: Xinyue Ye, LAUP & Urban Data Science Lab