The Field Robotics Center

Seminar Series

Thursday, February 16 **NSH 1507 1:00 – 2:00pm**

Lunch will be served

Shichao Yang
Ph.D. Student
CMU Mechanical Engineering,

Visual SLAM with Semantic Scene Understanding

Abstract: Simultaneous localization and mapping (SLAM) has been widely used in autonomous robots and virtual reality. Existing SLAM algorithms can achieve impressive results in feature-rich environments but cannot work robustly in some challenging low-texture scenarios. In addition, sparse geometric map representation from SLAM is limited for many advanced tasks including robot obstacle avoidance and interactions which may require a high-level semantic understanding of environment layout and 3D object locations. However, current layout estimation object detection usually only works in Manhattan box rooms and not robust to various environment structures, camera views and object occlusions.

In this work, we propose a novel approach to solve SLAM and scene understanding in a unified framework and demonstrate that these two tasks can benefit each other, with the ability to work in large scale and diverse environments. We first build a new graphical model for single image understanding and develop efficient inference algorithm for it which can build a complete 3D model to provide constraints for state estimates and mapping. Then, we propose a new bundle adjustment system to jointly optimize camera poses, with objects and layouts considering the geometric and contextual relationships between them. We also naturally extend it to cluttered and dynamic environments.

Speaker Bio: Shichao Yang is a Ph.D. student in the Mechanical Engineering at Carnegie Mellon University, advised by Prof. Sebastian Scherer in the Robotics Institute. He received a B.S in Mechanical Engineering from Shanghai Jiao Tong University in 2013. His research focuses on visual simultaneous localization and mapping (SLAM) combined with semantic scene understanding, to improve the robot intelligence in challenging real-life environments.




For further information please contact: Michael Kaess, kaess@cmu.edu

www.frc.ri.cmu.edu