Thesis Defense

Computer Science Master's Program

"MORP: Monocular Orientation Regression Pipeline"

By **Jacob Gunderson**

Abstract:

Orientation estimation of objects plays a pivotal role in robotics, self-driving cars, and augmented reality. Beyond mere position, accurately determining the orientation of objects is essential for constructing precise models of the physical world. While 2D object detection has made significant strides, the field of orientation estimation still faces several challenges. Our research addresses these hurdles by proposing an efficient pipeline which facilitates rapid creation of labeled training data and enables direct regression of object orientation from a single image. We start by creating a digital twin of a physical object using an iPhone, followed by generating synthetic images using the Unity game engine and domain randomization. Our deep learning model, trained exclusively on these synthetic images, demonstrates promising results in estimating the orientations of common objects. Notably, our model achieves a median geodesic distance error of 3.9 degrees and operates at a brisk 15 frames per second.

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Time: 4:00 PM – 6:00 PM
Location: 14-232b
Committee: Dr. Seng, Dr. Beard, Dr. Assal