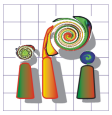

Leibniz Universität Hannover

Smart Pose Estimation of VR-Glasses in Driving Vehicle

Master's Thesis

Mootez Cheikh Zaouali
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Examiner Prof. Dr.-Ing. habil. Christian Heipke

Supervisor Dr.-Ing. Max Mehltretter

Abstract

Virtual Reality(VR) applications are expanding and are now a point of interest to car manufacturers for a multitude of purposes such as entertainment, work or education. For this purpose, tracking of the head-mounted device in real-time, leveraging the already accessible data from images to IMU information with minimal external sensors has become a necessity to assure the comfort of users.
In this work a deep learning architecture for camera relocalization using images as input is presented. The model is based on PoseLSTM and leverages the benefits of convolutional neural networks for computer vision and feature detection, Long-short-term-memorys for feature extraction and Monte-Carlo-Dropout for epistemic uncertainty estimation. A Bayesian approach of PoseLSTM is evaluated showing convergence of the iterations' mean to the true values of King's College dataset and a successful estimation of the uncertainty of data. Furthermore, A novel dataset consisting of seven sequences of images taken from an internal camera of the "HTC Vive flow" AR glasses and labelled using an external pose tracker is presented. The evaluation of the results on the new dataset show high uncertainty and low accuracy in the predictions which questions the viability of pose estimation with mentioned head-mounted device.