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SenSIP Student Seminar Series

Energy efficient object tracking via adaptive subsampling

Presenter: Odrika Iqbal

PhD Student

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Abstract

Image sensors with programmable region-of-interest (ROI) readout are a new sensing technology important for energy-efficient embedded computer vision. In particular, ROIs can subsample the number of pixels being readout while performing single object tracking in a video. We have developed an adaptive sampling algorithm that performs joint object tracking and predictive video subsampling. We utilize an object detection consisting of either mean-shift tracking or a neural network, coupled with a Kalman filter for prediction. We show that our algorithm achieves a mean average precision of 0.70 or higher on a dataset of 20 videos in software. Further, we have implemented hardware acceleration of mean-shift tracking with Kalman filter adaptive subsampling on an FPGA. Hardware results show a 23 times improvement in clock cycles and latency as compared to baseline methods and achieve 38FPS real-time performance. In addition, we have investigated and implemented the coded exposure-based deblurring technique for efficient object tracking. Currently, we are working on a reinforcement learning-based solution.

Biography:

Odrika Iqbal is a PhD student at Arizona State University in the School of Electrical, Computer and Energy Engineering (ECEE). She is co-advised by Dr. Andreas Spanias and Dr. Suren Jayasuriya. She did her bachelor's in Electrical and Electronic Engineering at Bangladesh University of Engineering and Technology. Her research interests include computational imaging, computer vision and tiny ML for embedded computer
vision systems

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