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Social-STGCNN: A Social Spatio-Temporal Graph Convolutional Neural Network for Human Trajectory Prediction

Speaker: Christian Claudel, Ph.D., The University of Texas at Austin

Abstract: Better understanding of pedestrian paths leads to safer and more efficient interactions between pedestrians and vehicles. Pedestrian trajectories are not only influenced by the pedestrian itself but also by its interactions with surrounding pedestrians and vehicles. Previous methods modeled these interactions by using a variety of aggregation methods that integrate different learned pedestrian states. We propose the Social Spatio-Temporal Graph Convolutional Neural Network (Social-STGCNN), which substitutes aggregation methods by a graph based model. Our results show more accurate predictions of future pedestrian positions, using drone-captured video datasets. In particular, Social-STGCNN leads to a 20% improvement over state-of-the-art methods on the Final Displacement Error (FDE) and an improvement on the Average Displacement Error (ADE), with 8.5 times less parameters and up to 48 times faster inference speed than previously reported methods. In addition, this model is data efficient, and exceeds previous state of the art on the ADE metric with only 20% of the training data. We propose a kernel function to embed the social interactions between pedestrians within the adjacency matrix. Through qualitative analysis, we show that the model encodes social behaviors that can be expected between pedestrians and other vehicles.



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