*Course Project Choice:*

**1. *Pedestrian trajectory prediction:***

Data (World Plane Human-Human Dataset):

* Training set: composed of 4 different Data with 3909 pedestrians in total
* Test set: composed of 3 different Data with 4933 pedestrians in total

Evaluation:

In this case, we can use different metrics like:

* Average displacement error: MSE over all estimated points of a trajectory and the true points
* Final displacement error: The distance between the predicted final destination and the true final destination at end of the prediction period

State-of-the-art methods:

Every person move with a different velocity, acceleration and gait. We need a model which can understand and learn such person-specific motion properties. Long Short-Term Memory (LSTM) networks can be used in this case. In this architecture, we can add activation function as ReLU, a L2 regularisation in order to eliminate over-fitting and normalizations to improve the convergence.

**2. *Vehicle trajectory prediction:***

Data (T-Drive trajectory):

The sample is coming from T-Drive trajectory and contains one-week trajectories of 10,357 taxis. In total, there are about 15 million of points and the distance travelled is about 9 million kilometres.

Evaluation:

Using the mean squared error as the cost function, we have to minimize the following formulation:

where Ll is the center location of the target object that predicted by trajectory predictor in video i at frame t.

State-of-the-art methods:

We can use the recurrent neural network called long short-term memory (LSTM) seen in class to analyze the temporal behavior and predict the future position of the surrounding vehicles.

**3. *Multi-object tracking:***

Data (MOT17 Challenge):

All MOT16 sequences are used with a new, more accurate ground truth. Each sequences is provided with 3 sets of detections: DPM, Faster-RCNN, and SDP.

* Training set Total : 15948 frm. and 645 s.
* Test set Total : 17757 frm. and 744 s.

Evaluation:

In this case we can use two different accuracies if we speaking of ground truth:

* ID Switches: calculate the number of times the Object Id (Tag) for the object changes divide by the sum of total frames of each object.
* Mismatch Rate: Calculate the maximum number of frames object is assigned the same id and then normalize it by dividing by sum of total frames of each object.

State-of-the-art methods:

The LSTM can learn the velocity and the direction of motion of the object, and infer if the new object can belong to the existing trajectory or not. VGG CNN model initialized from ImageNet can be used to learn image representations and finally A Softmax classifier can handle the outputs.

References:

3DOF Pedestrian Trajectory Prediction Learned from Long-Term Autonomous Mobile Robot Deployment Data, *Li Sun1 and Zhi Yan2 and Sergi Molina Mellado1 and Marc Hanheide1 and Tom Duckett1*, 30 Sep 2017.

Probabilistic Vehicle Trajectory Prediction over Occupancy Grid Map via Recurrent Neural Network, *ByeoungDo Kim, Chang Mook Kang, Jaekyum Kim, Seung Hi Lee, Chung Choo Chung, and Jun Won Choi*, 1 Sep 2017.

Social LSTM: Human Trajectory Prediction in Crowded Spaces, Alexandre Alahi∗, Kratarth Goel∗, *Vignesh Ramanathan, Alexandre Robicquet, Li Fei-Fei, Silvio Savarese, Stanford University*, June 2016