

Don't Miss the Bus

Have you ever found yourself running to catch the bus, only to miss it by 5 seconds? Or have you ever been standing out in the rain for 20 minutes waiting for a bus that never shows up? You may never find yourself in these situations again. Cooper Sloan, a researcher in the Julia Lab at MIT has developed a system to predict bus arrival times using historical data.

Buses transit times are more difficult to predict than cars because they have to adhere to schedules and wait for passengers. Additionally, buses suffer from a phenomenon called clumping. This is because as a bus starts running behind schedule, more riders arrive at future stops and slow down the bus even more. This causes buses to clump up, slowing down all of the other buses on the route. Because of this, sophisticated techniques have been developed to predict bus arrival times. The most effective technique uses neural nets, a type of model which gets better at prediction as it gets more data. In this case the neural net takes in historical arrival times for a stop, and outputs a prediction for the arrival times at future stops. These models can be used to accurately predict bus arrival times several stops ahead. When compared with other types of models, neural nets show the best performance.

The research at MIT focuses on using neural nets with a large scale data set, which spans several years of the Boston bus system. Most current research uses a small amount of data, over the scale of months and not years. Because of the size of the Boston dataset, the models can exploit seasonality. Seasonality refers to the patterns which occur throughout the year. Neural nets can pick up on complicated patterns which affect bus arrival times, such as seasonal weather, holidays, and tourism peaks. These seasonality patterns can be learned by the model with data from that part of the year. For example, a model can be trained with data from winter 2016 to predict arrival times in winter of 2017. By training the model with data from the same period, the accuracy of prediction can be increased.

In the future, predictions from neural nets can be sent to users for example via a mobile app, so that they can plan to arrive at the bus stop on time. This will improve the efficiency of the bus network, and decrease transit times for riders.