

Predicting the usage of station based bike sharing

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Abstract

Time-series prediction is a subject area of deep learning architectures. Since a few years breakthroughs were made in this field with the invention of the LSTM architecture, a form of recurrent neural network, in all kinds of applications, like translations, speech recognition etc. This paper presents the work on the prediction of a time-series which is taken from the operation of a bicycle sharing network. BIXI Montreal is a provider of station-based bicycle rental in Montreal. If bicycles are unevenly distributed in the network, the providers must intervene. The goal is to make predictions about the usage of this network, especially the in- and outflow of bicycles at the stations. In this project just temporal data of the stations is used and for each point in time the delta of rental bikes is calculated. The training was supported by additional environment data. The impact of this additions was then discussed. Furthermore, other optimizations for the network were used and their effectiveness for this dataset was investigated. To determine the quality of the final results, some primitive baseline models were created. The results of these baseline models were then compared to the results in the deep learning models. During the work, the problem of dividing data into test and validation data occurred, which lead to inconsistent results for the training and validation accuracy. Therefore, this paper deals with the process of this division. Furthermore, a mechanism of early detection of differences between training and validation accuracy was used, which can stop long training sessions early, if the difference is too large. This prevents a waste of time and resources for a training run, which inevitably won't produce useful results. In conclusion this work did not achieve the goal to make reliable predictions for this dataset. The reason why the learning of the network was so low might lie within the sparsity and the general noise of the dataset. In the end, predicting the delta of incoming and outgoing bikes might have been the wrong decision, since there are possibly too few patterns in the resulting dataset.