Dynamic Demand Prediction for Sustainable Bike Sharing Systems

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Literature Review

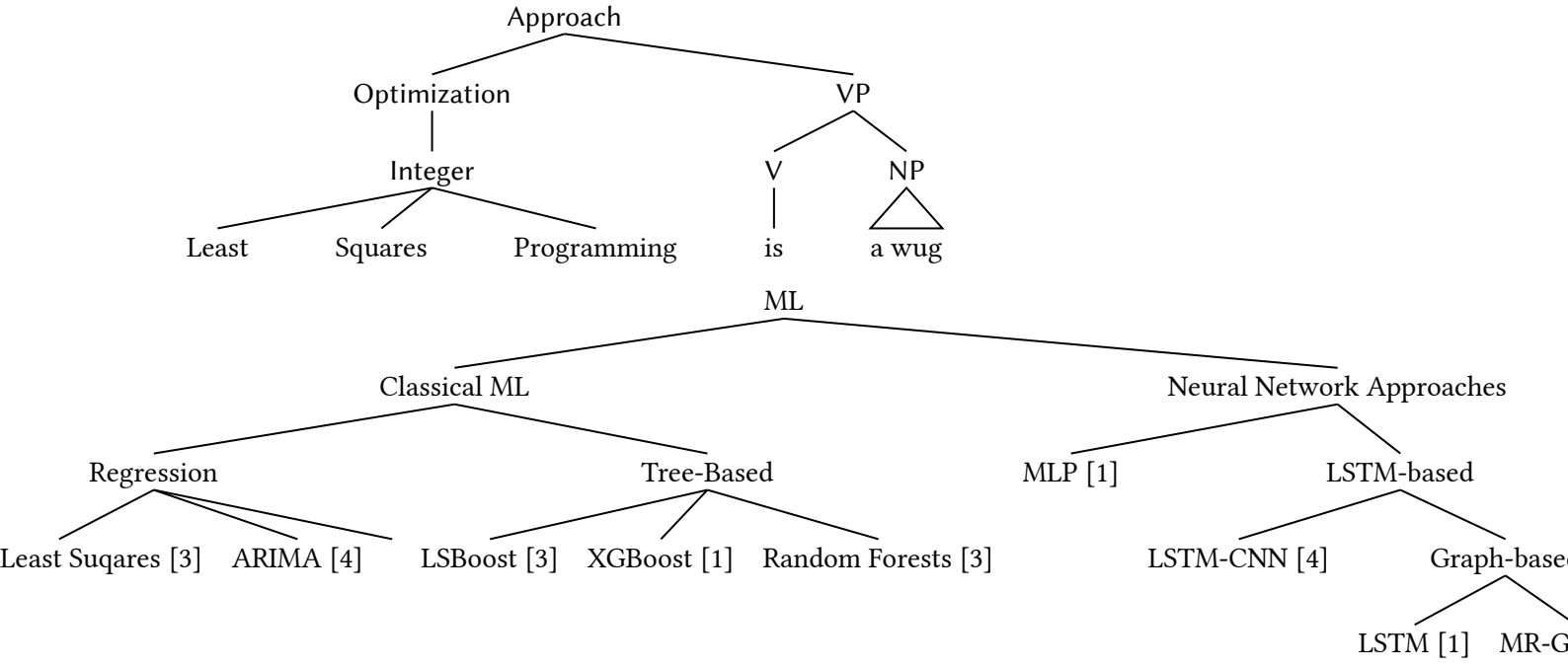
Due to the vastly growing number of bike sharing systems, bike sharing demand prediction has been investigated by a number of authors in the last 15 years. While classical machine learning approaches such as regression and boosting have been used in the early developments, in recent years, deep learning approaches have been found to give significant advantages in the forecasting domain [1].

Based on the literature, we compare the following recent machine learning approaches to bike sharing demand prediction, selected according to publishing date and impact, and identify open problems.

3. Modeling bike-sharing demand using a regression model with spatially varying coefficients [2]:
4. Modeling Bike Availability in a Bike-Sharing System Using Machine Learning [2]:

Taxonomic Table and Tabular Comparison

We divide the given approaches according to the used models.



For the development of accurately prediction approaches the most important factors are:

- The data used: Essential is the features incorporated and the size, diversity and quality of the dataset. Because all compared approaches use recorded data from bike-sharing systems, the quality of the data is uniformly high, however, the size varies. We propose to classify features:
- The architecture of the model: In order to achieve intelligent prediction, usually deeper models perform significantly better. Special modules of neural network architecture, such as Memory

Components (RNNs, LSTMs, GRUs), Convolutions (CNN, GNN) or attention components strongly influence what the model is able to learn.

Approach	Target Variable	Spatial Features Incorporated	Spatial Architecture	Temporal Features
Temporal Architecture				

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