DTSA 5509 Final Project:

Predicting Parent Satisfaction with their Kindergarten using Supervised Machine Learning Models

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How to find a good kindergarten in Norway?

You can …

- look up the kindergarten in the Norwegian Parent Survey for kindergartens. It will give tell you what parents think about the kindergarten's services.
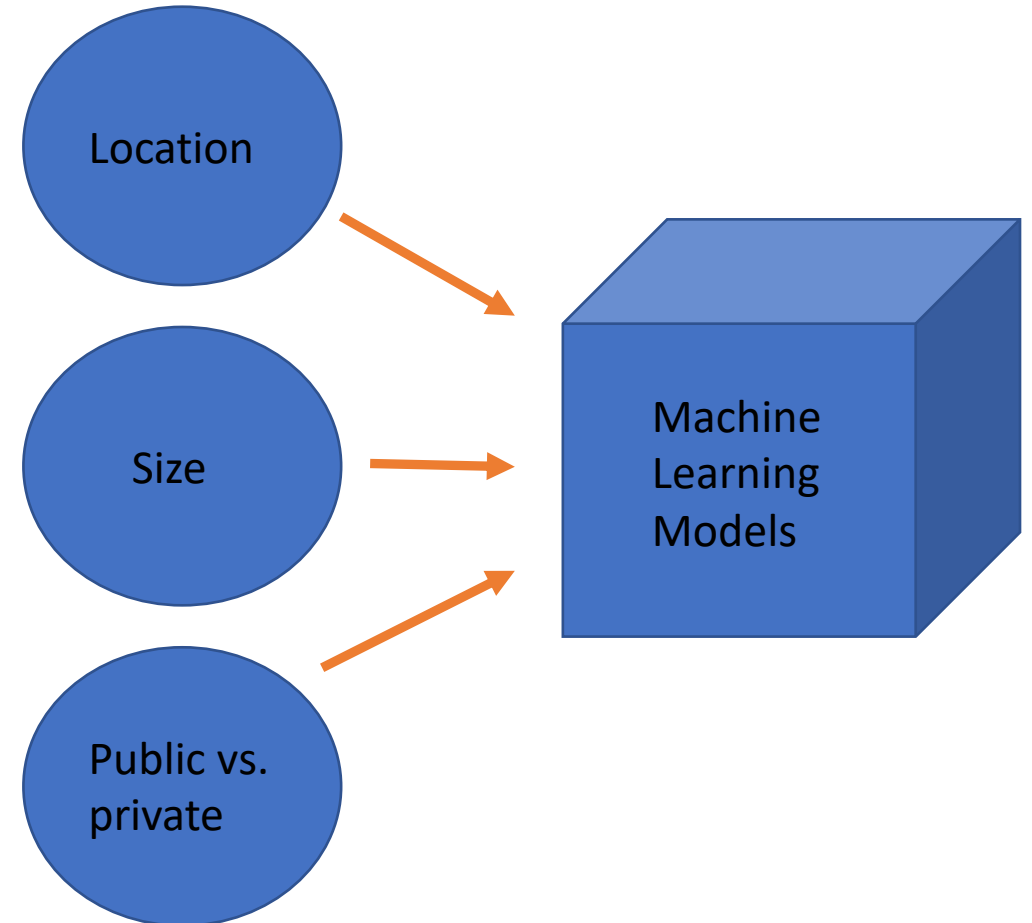
However, …

- there are many kindergartens that are not included in the survey data

In those cases, …

- the notebook provided in this project is an alternative. It makes use of the survey data to train machine learning models that can estimate the parent satisfaction level for these kindergartens.
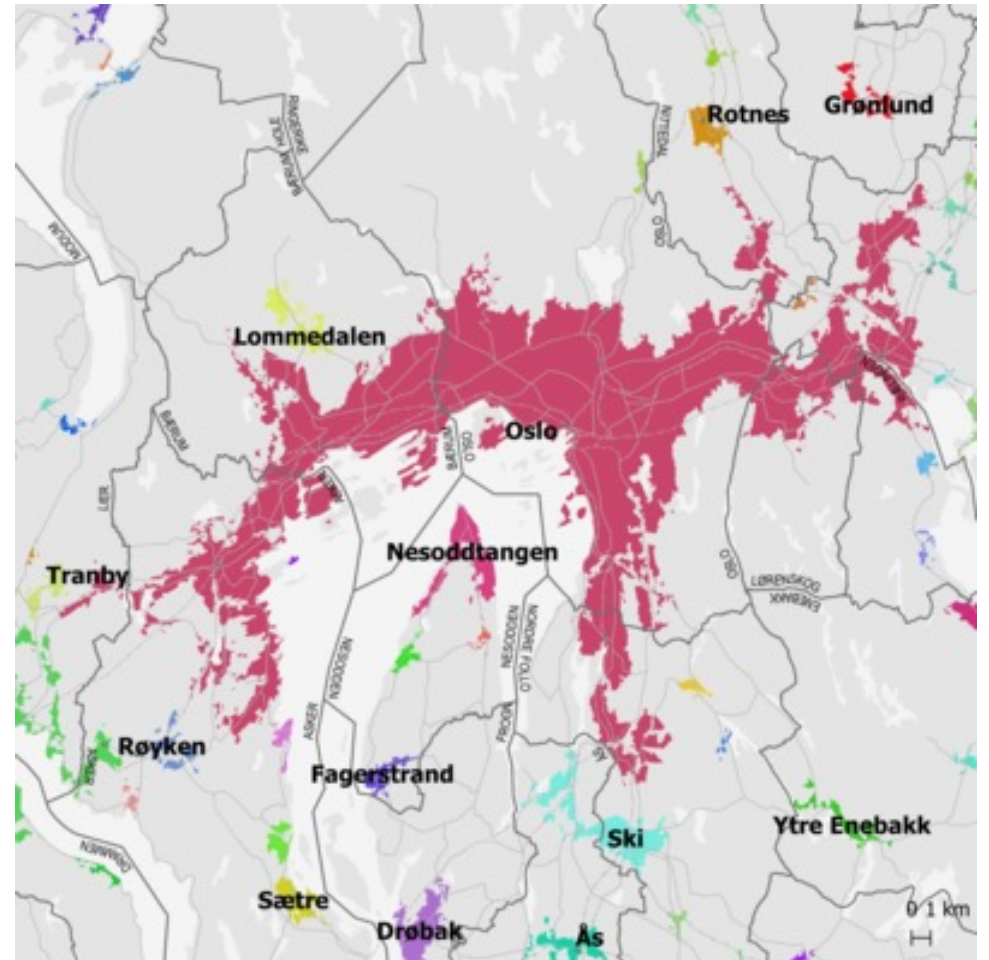
Data I:

- The data is taken from the Norwegian Parent Survey for kindergartens.

- The survey gives parents an opportunity to state how they feel about the kindergarten services.

- The survey contain three types of **feature** variables for the kindergartens – location, size and ownership

Location

Size

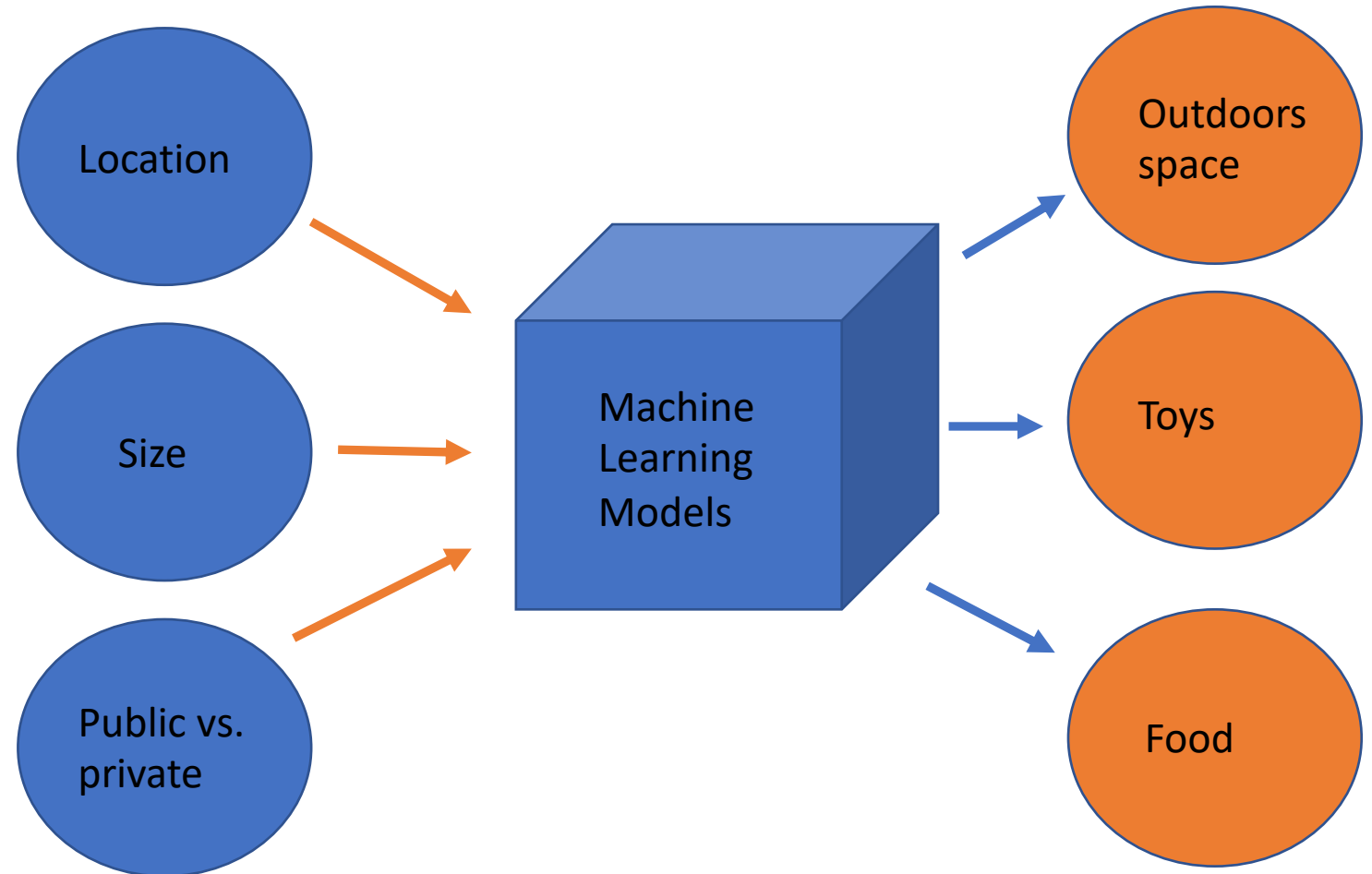Public vs. private

Machine Learning Models

Data II: Limit Analysis to Oslo Urban Area (Oslo tettsted)

- The survey is carried out every year and include parents all across the country.

- However, in the dataset for this project, we will only make use of data for 2022, and we will only include kindergartens in counties that belong to the Oslo Urban Area

- 1 064 235 inhabitants as of 1st of January 2022

- Typically, the area where a family might move if they want to work in Oslo

- Consist of the municipalities: Oslo (with 12 city-districts), Bærum, Asker, Lillestrøm, Lørenskog, Nordre Follo, Rælingen, Nittedal og Lier

Data III: Limit analysis to three class variables

- The survey consists of 30 questions that allow the parents to express their opinion about different aspects of the kindergarten services.

- However, in our dataset, we only include three questions: how the parents perceive
  - the outdoors playing area,
  - the toys available to the kids and
  - the quality of the food served.

Location

Size

Public vs. private

Machine Learning Models
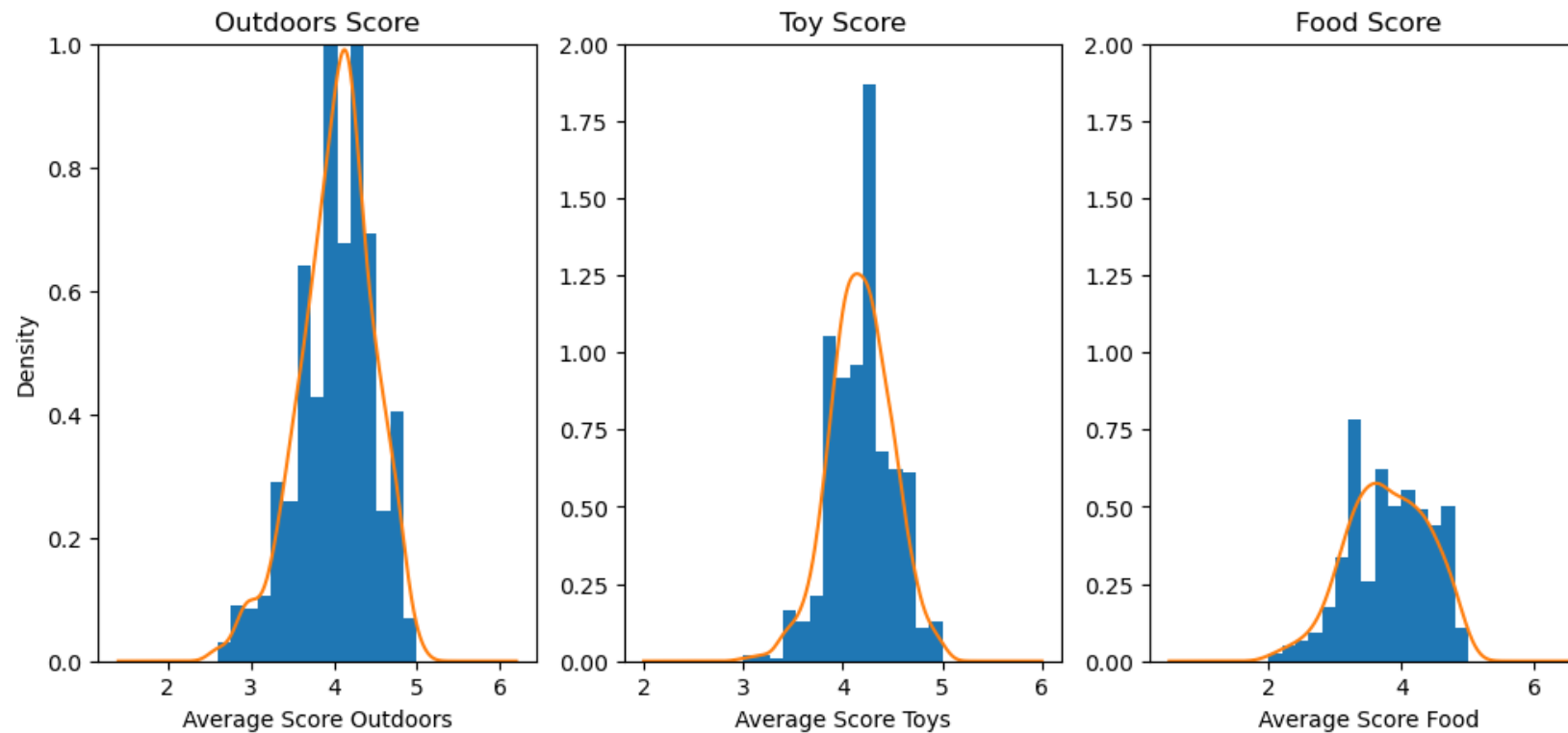
Outdoors space

Toys

Food

Exploratory Analysis: Kindergartens in Norway

- Kindergartens in Norway are highly regulated

- Payments are regulated

- Operation of the kindergarten must fulfill a wide range of quality standards (e.g., number of staff per child)

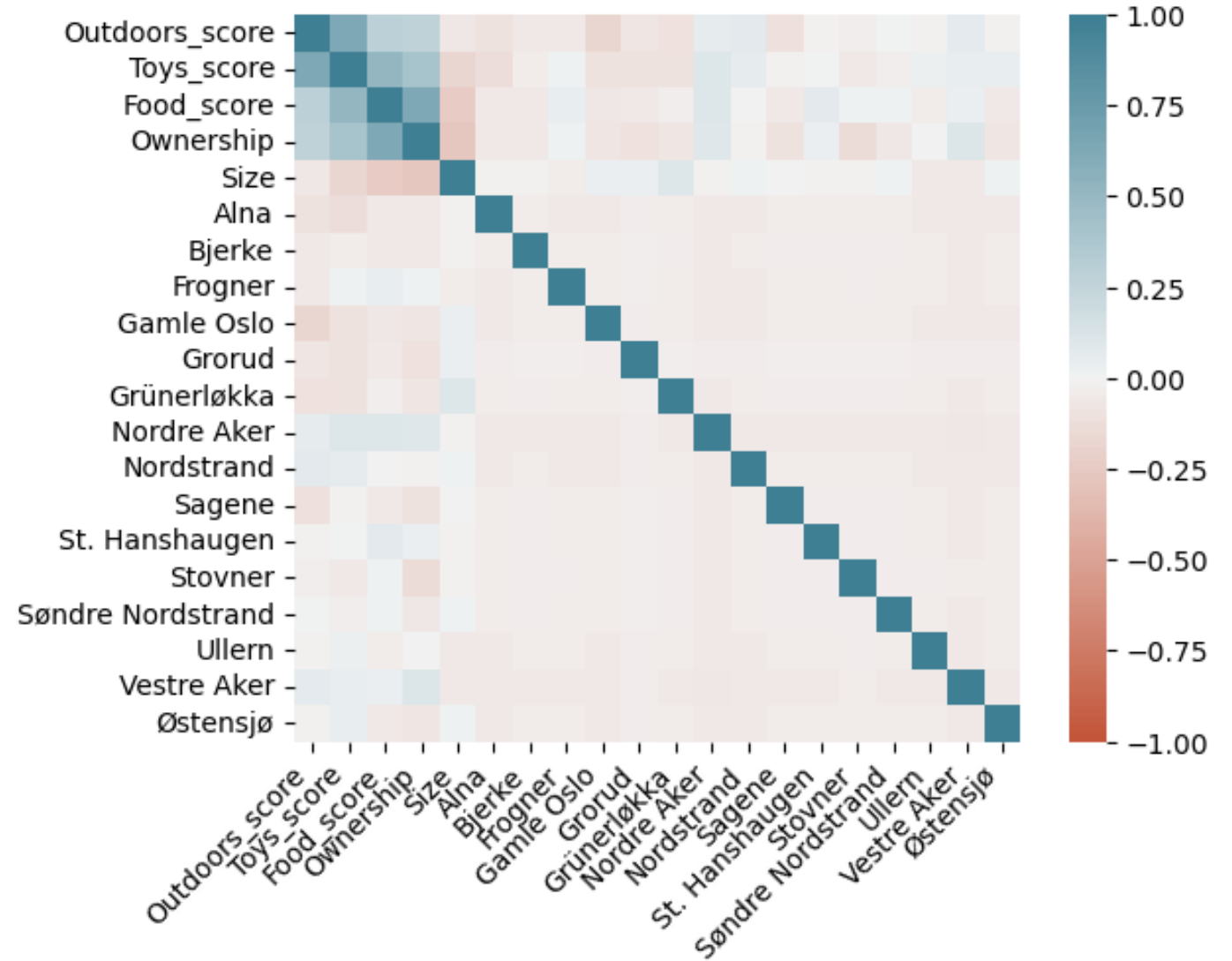- Cannot expect to find dramatic differences between kindergartens

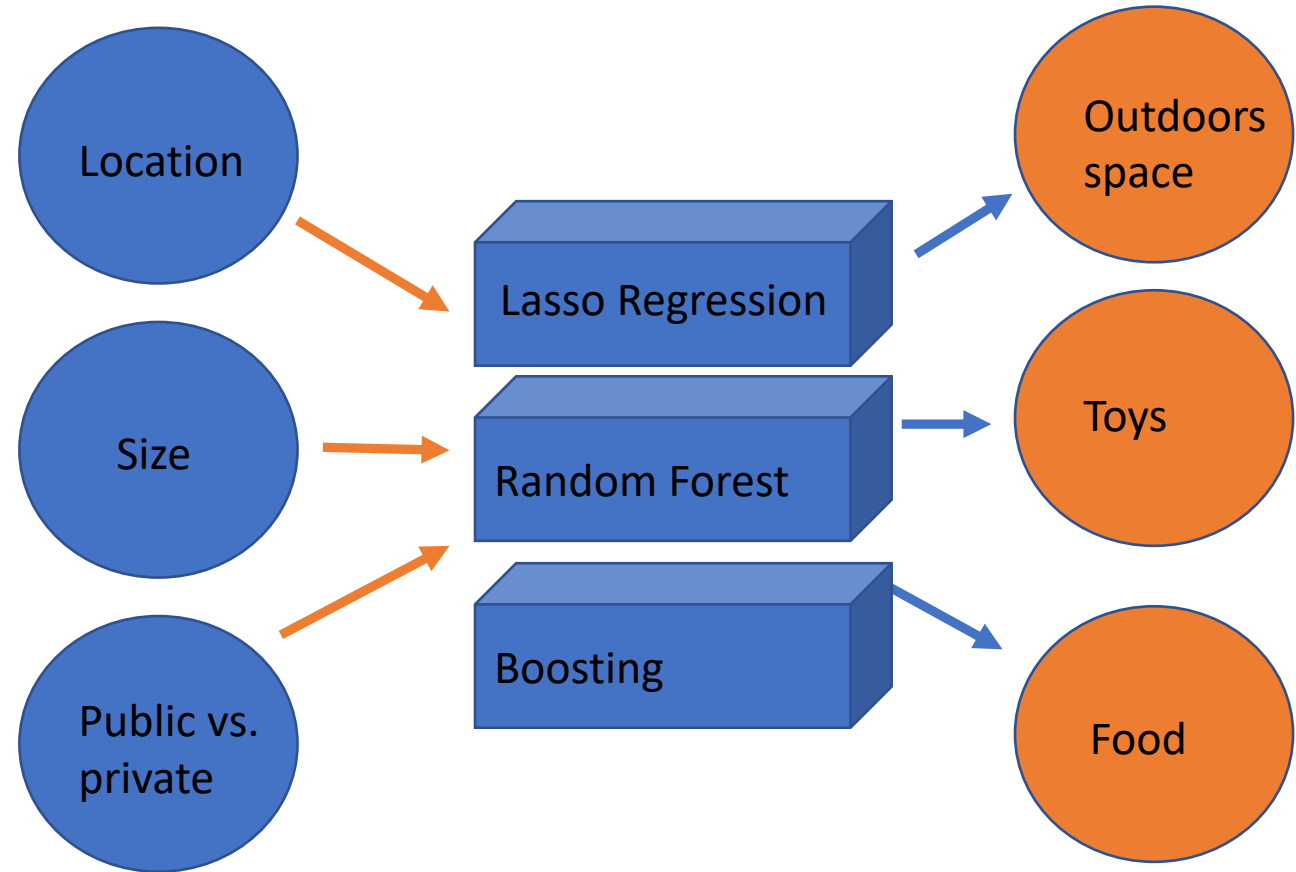# Exploratory Data Analysis II: Class scores (1-5)

Exploratory
Data Analysis III

- None of the features are strongly correlated with any of the three class variables (Outdoors_score, Toys_score and Food_score).
- However, Ownership seem to be moderate positive correlation with the Toy and Food score.
- Similarly, Size seem to have a moderate negative correlation with Toy and Food score.
- The correlations between Outdoors area and other features are small.

Machine Learning Algorithms

- Each class variable predicted using three different machine learning algorithms – Lasso, Random Forest and Gradient Boosting

Evaluation

- Outdoors score using **Gradient Boosting**
- Toys score using **Gradient Boosting**
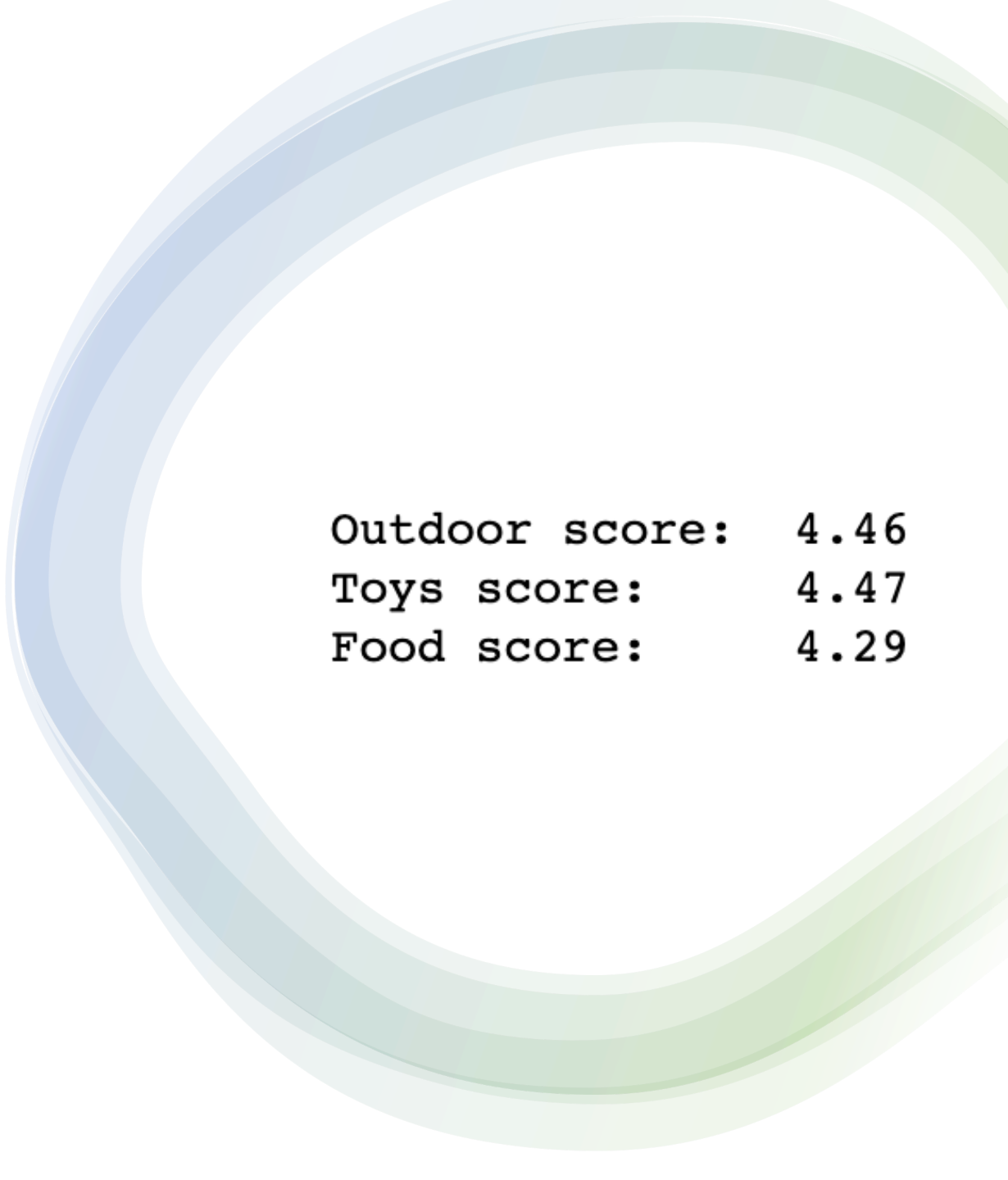- Food score using **Random Forest**

	Lasso R-squared	Lasso MAE	Random Forest R-squared	Random Forest MAE	Boosting R-squared	Boosting MAE
Outdoors	-0.005119	0.338036	0.026981	0.334318	0.029880	0.334357
Toys	0.137479	0.222005	0.163768	0.221439	0.164994	0.221501
Food	0.396664	0.367082	0.399788	0.368216	0.390695	0.369274

Prediction

- We will use **De Ni Musene familiebarnehage** (The Nine Mouses Family Kindergarten) at Nordstrand as an example-case.

'De Ni Musene' has the following stats:

- Ownership : private
- Size : 10
- Borough : Nordstrand

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Outdoor score:    4.46
Toys score:       4.47
Food score:       4.29
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