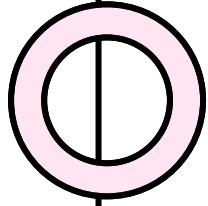


D E T E C T R E E

DISC DATA LAB

LUCIE, VINCENT, BENJAMIN





Our Goal



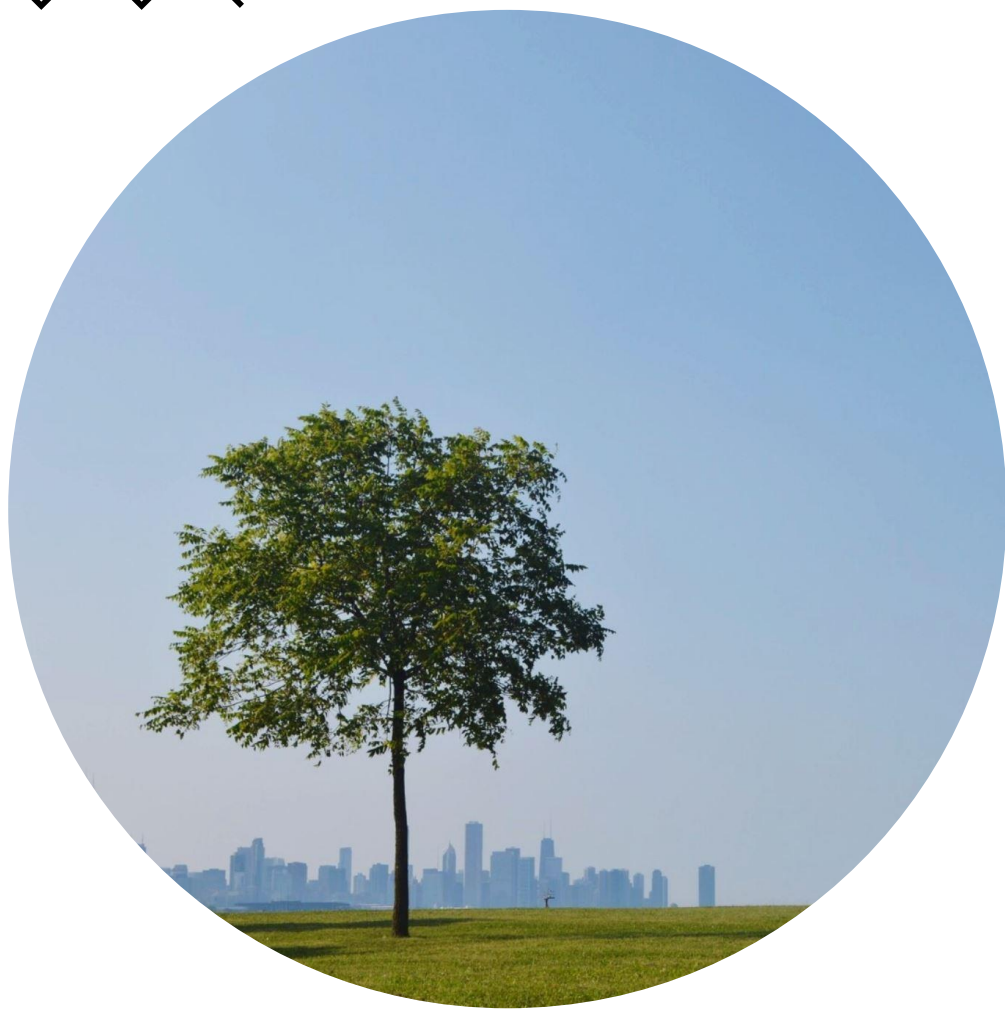
Analyse satellite images from different cities to obtain the tree share



Match this variable to different life-quality factors (satisfaction, health, ...) and air pollution



Correlation between variables and importance of trees in cities



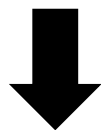
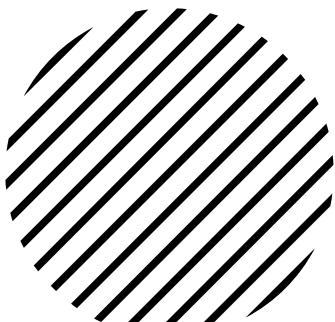
The importance of tree coverage

- In cities as an environmental factor
- The satisfaction and well-being of residents
- Provides biodiversity and ecological quality





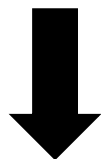
Data Flow



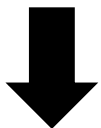
API

Detectree 

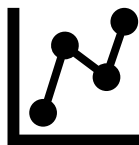
Functions called → But own workflow adapted to our needs

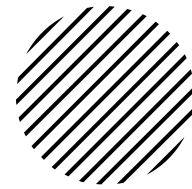
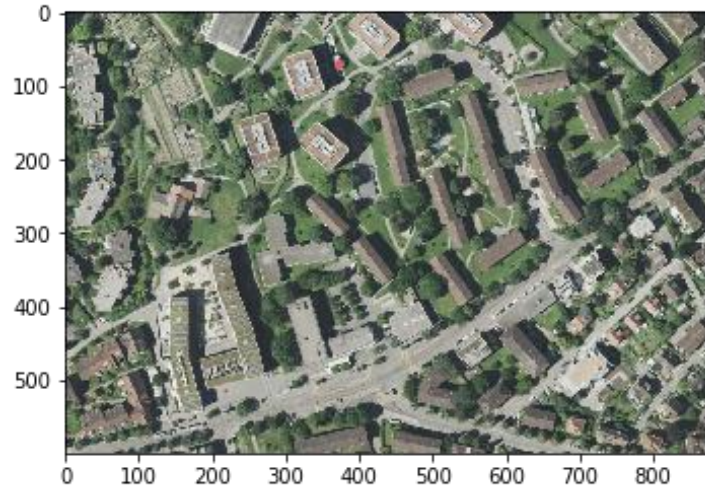


Classification and evaluation of tree coverage in Python



Data Analysis



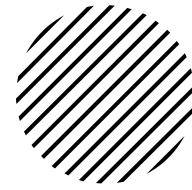
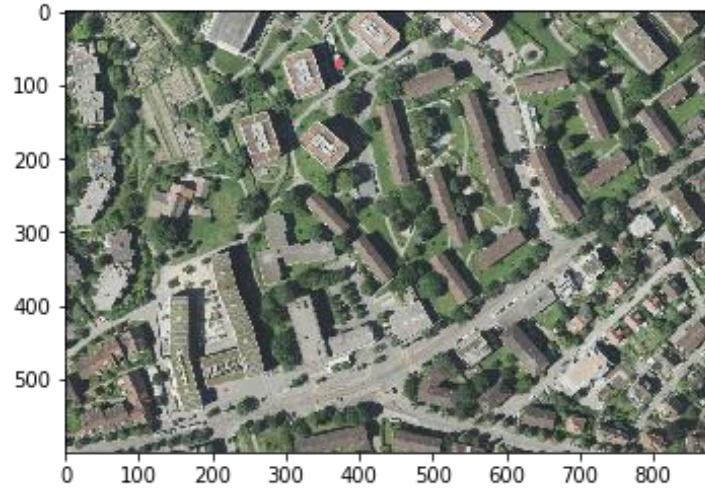


- Select the desired area:
- Longitude / Latitude
- Zoom level
- Slippy Map Tilenames specification:

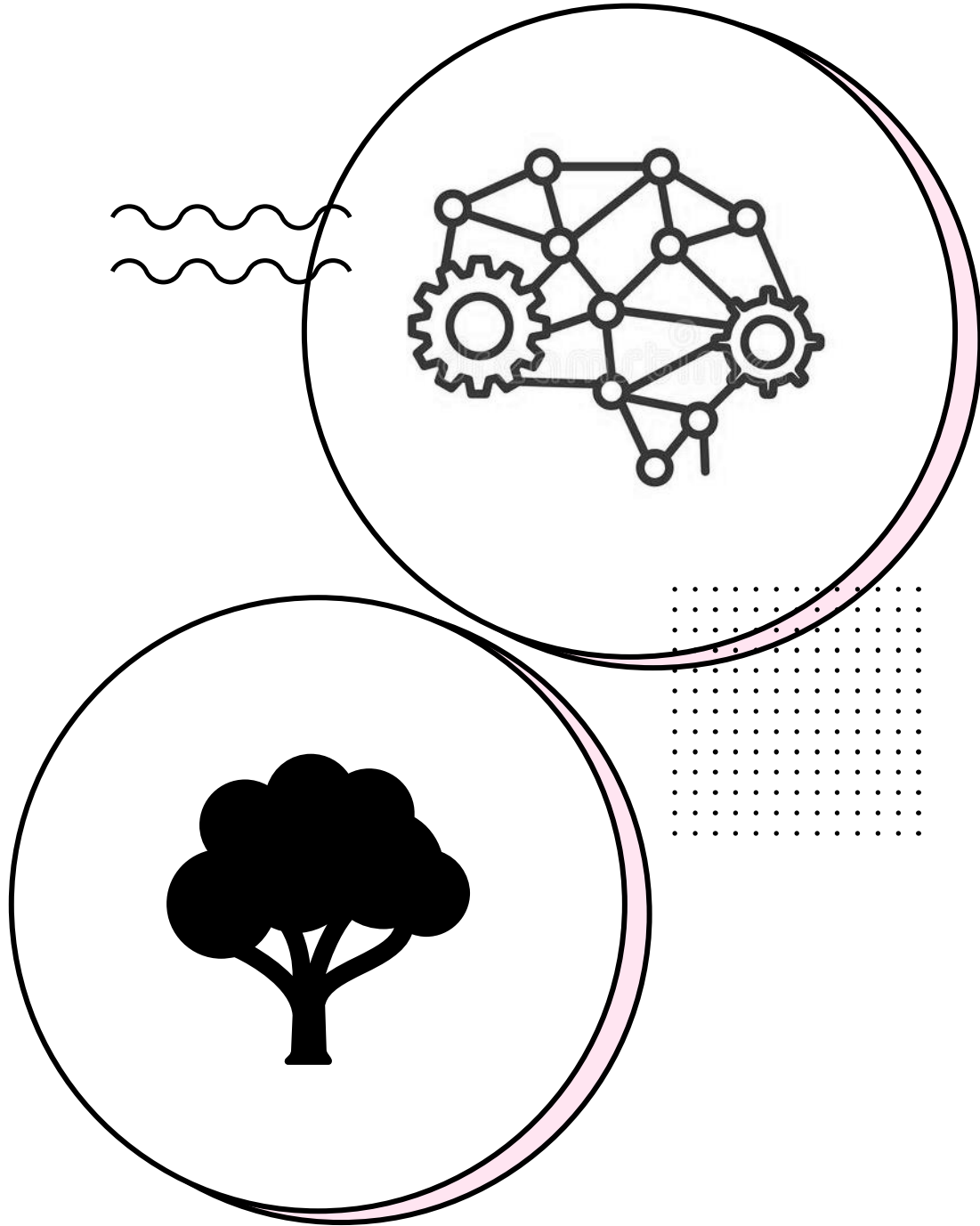
$$x = \left\lfloor \frac{lon + 180}{360} \cdot 2^z \right\rfloor$$

$$y = \left\lfloor \left(1 - \frac{\ln \left(\tan \left(lat \cdot \frac{\pi}{180} \right) + \frac{1}{\cos \left(lat \cdot \frac{\pi}{180} \right)} \right)}{\pi} \right) \cdot 2^{z-1} \right\rfloor$$

https://api.mapbox.com/v4/mapbox.satellite/{tile}@2x.jpg90?access_token={access_token}



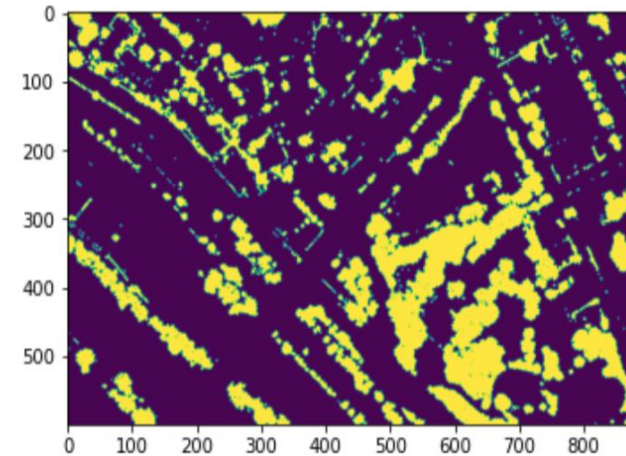
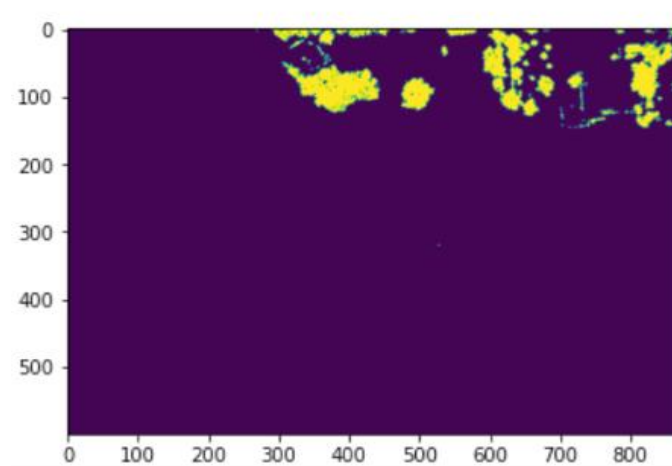
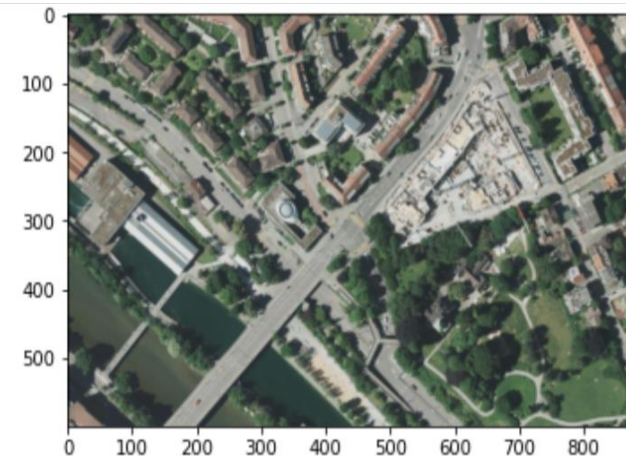
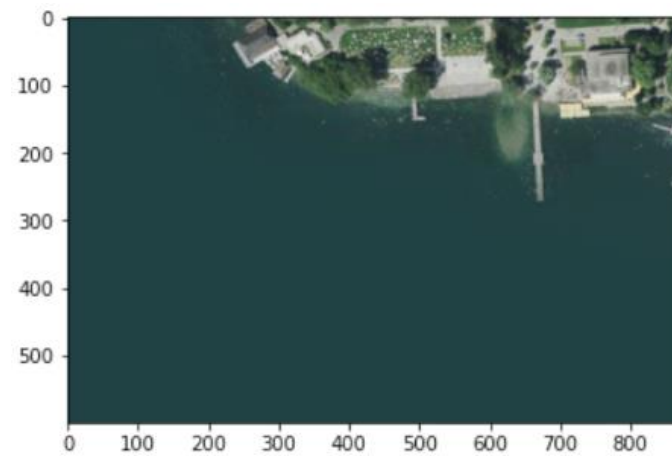
- Select the desired area
- Retrieve the satellite images via the Mapbox API
- Download the individual tiles
- Store the tiles



Detectree

- Supervised learning problem
- System must be trained on suitable data
- The tiles selected for training must be linked to the ground truth of the tree/non-tree masks

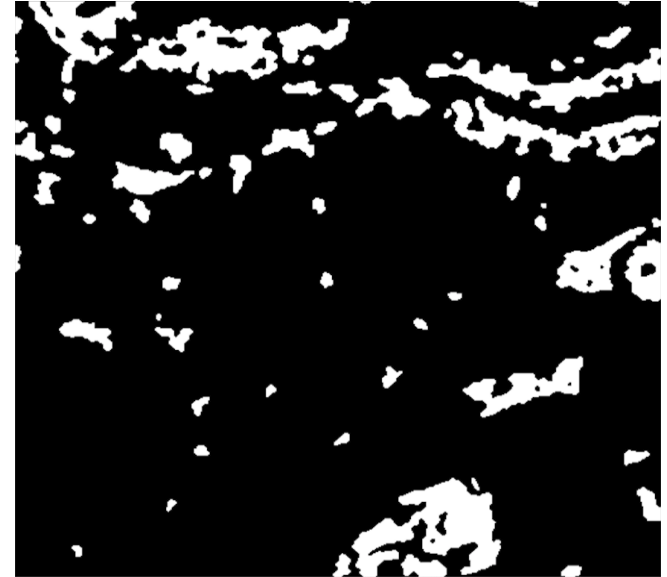
Detecttree



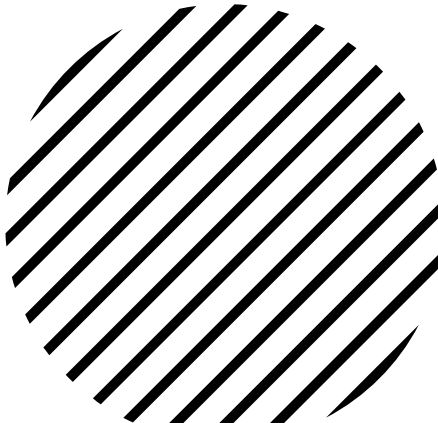
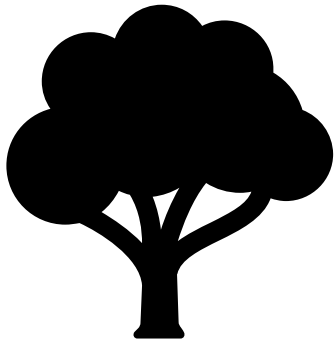
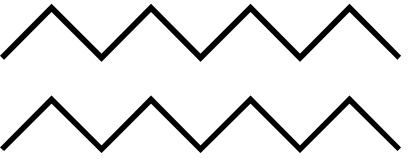
Detectree



- Training of classifiers
- Classifiers can be used to distinguish tree-like and non-tree-like pixels



Detectree



Incorrect classifications:

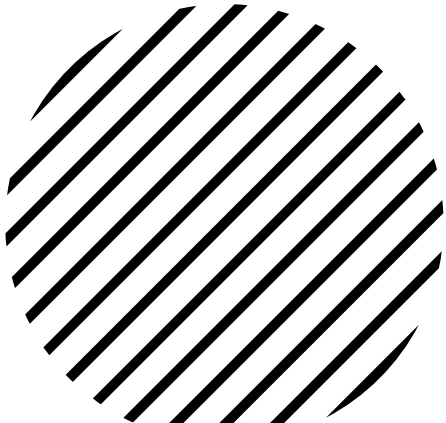
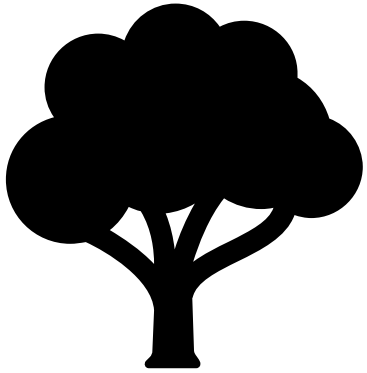
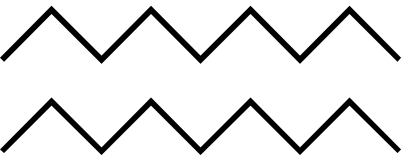
- Poor resolution
- Photos are not recorded vertically from above

Detectree

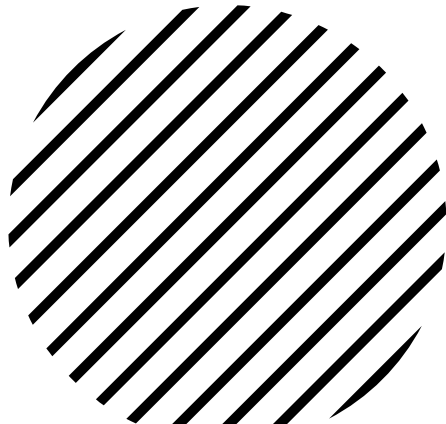
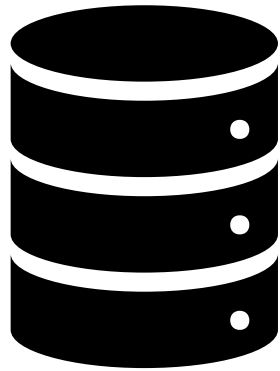
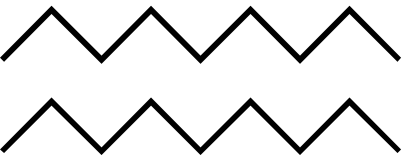


- Classification of tree-like and non-tree-like pixel for each tile
- Determine the proportion of predicted tree-like and non-tree-like pixels for each tile
- The accuracy is determined by comparison with manually created ground truth masks.

Detecttree

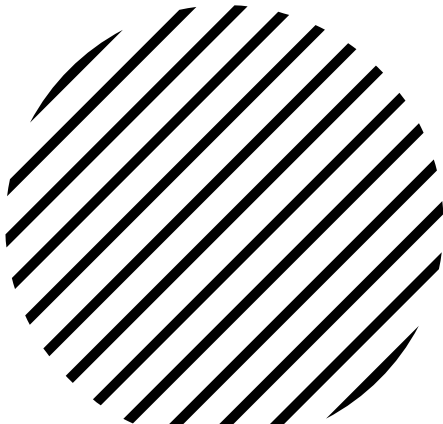
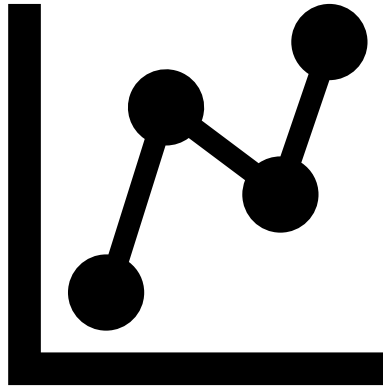
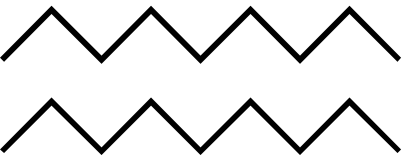


Data processing

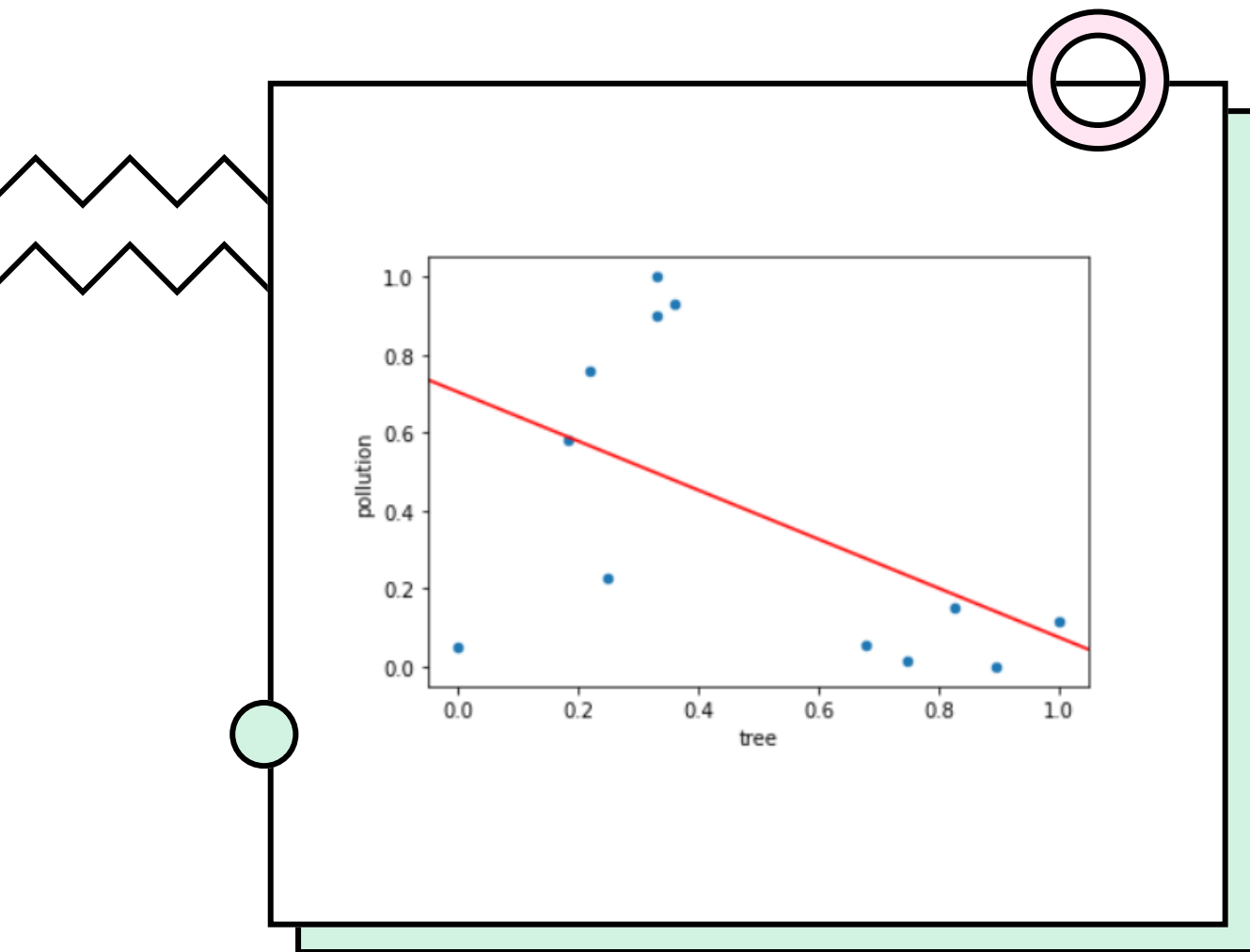


- Folder for each city with raw and predicted tiles
- Overall accuracy of 75%
- Percentage of tree coverage
- Secondary data from different cities with life satisfaction and environment indices

Data Analysis



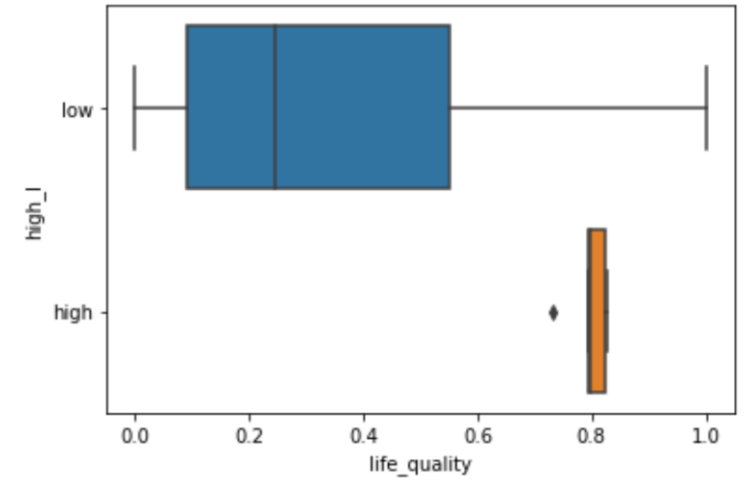
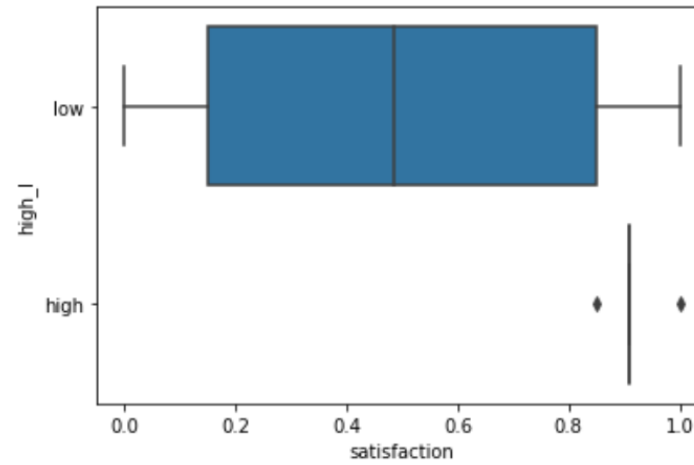
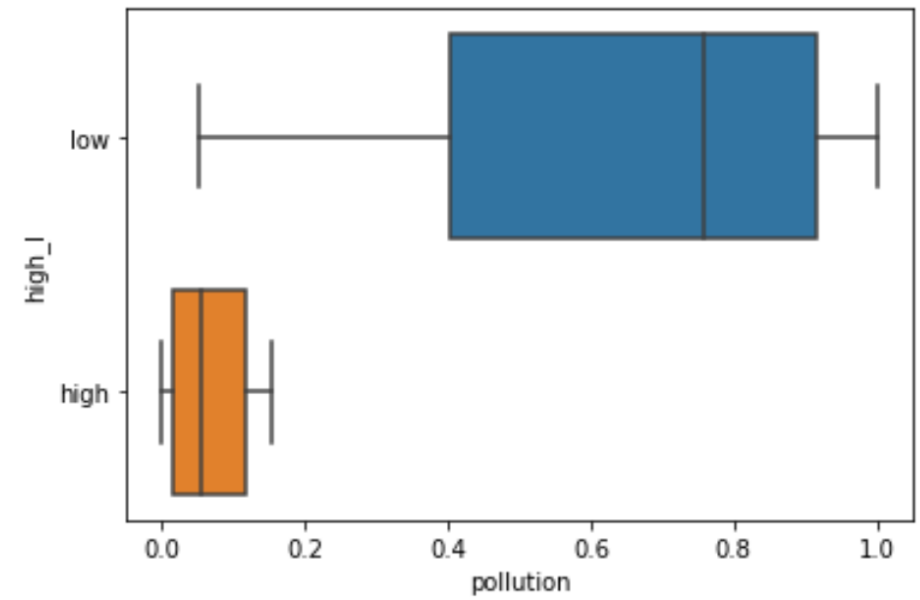
- Analysis 1 with detectree data (12 samples)
 - Boxplots
 - Linear Regression Modell
 - correlation matrix
-
- Analysis 2 with European environment agency data (78 samples)

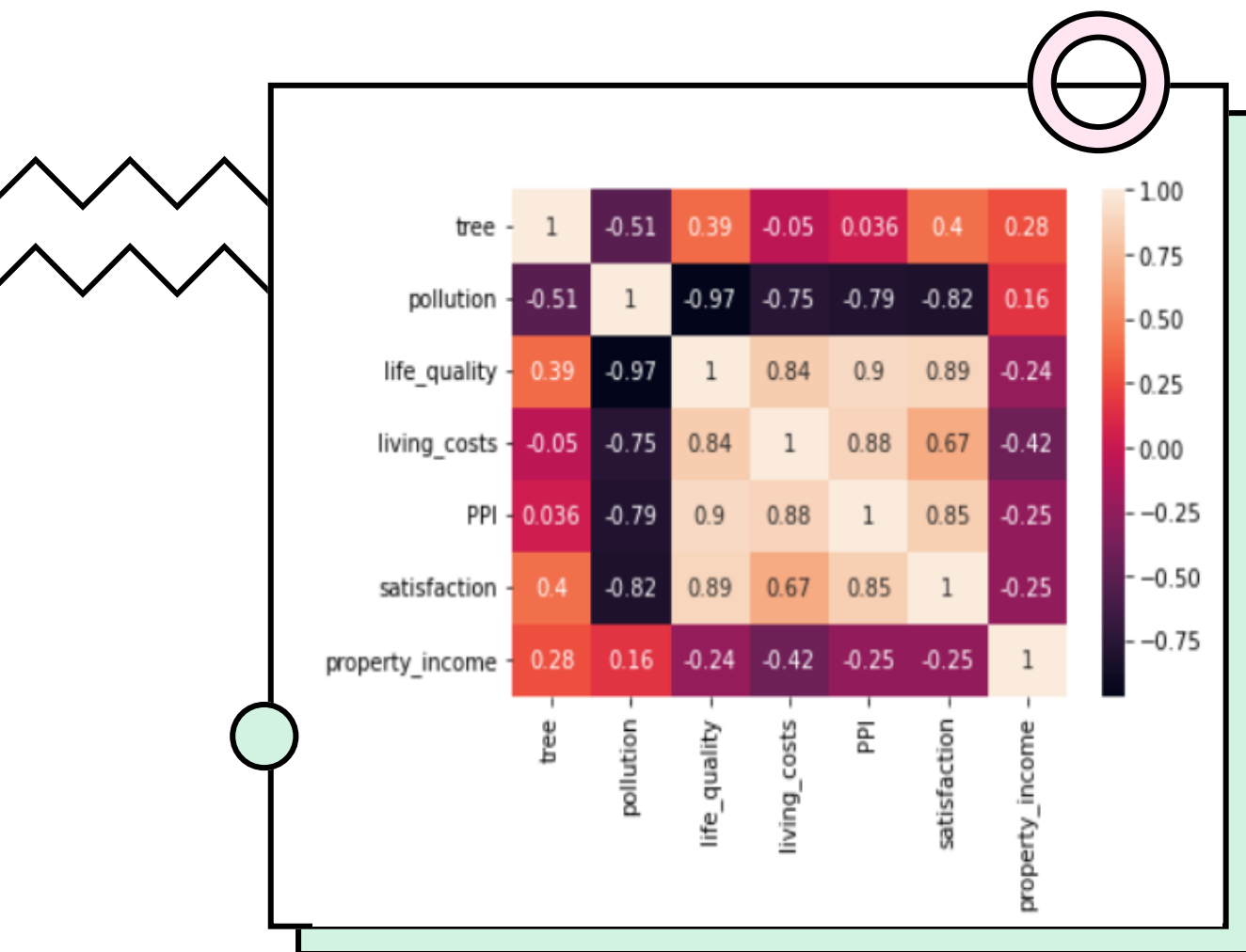


DATA ANALYSIS 1



BOX PLOTS: HIGH VS. LOW TREE SHARE



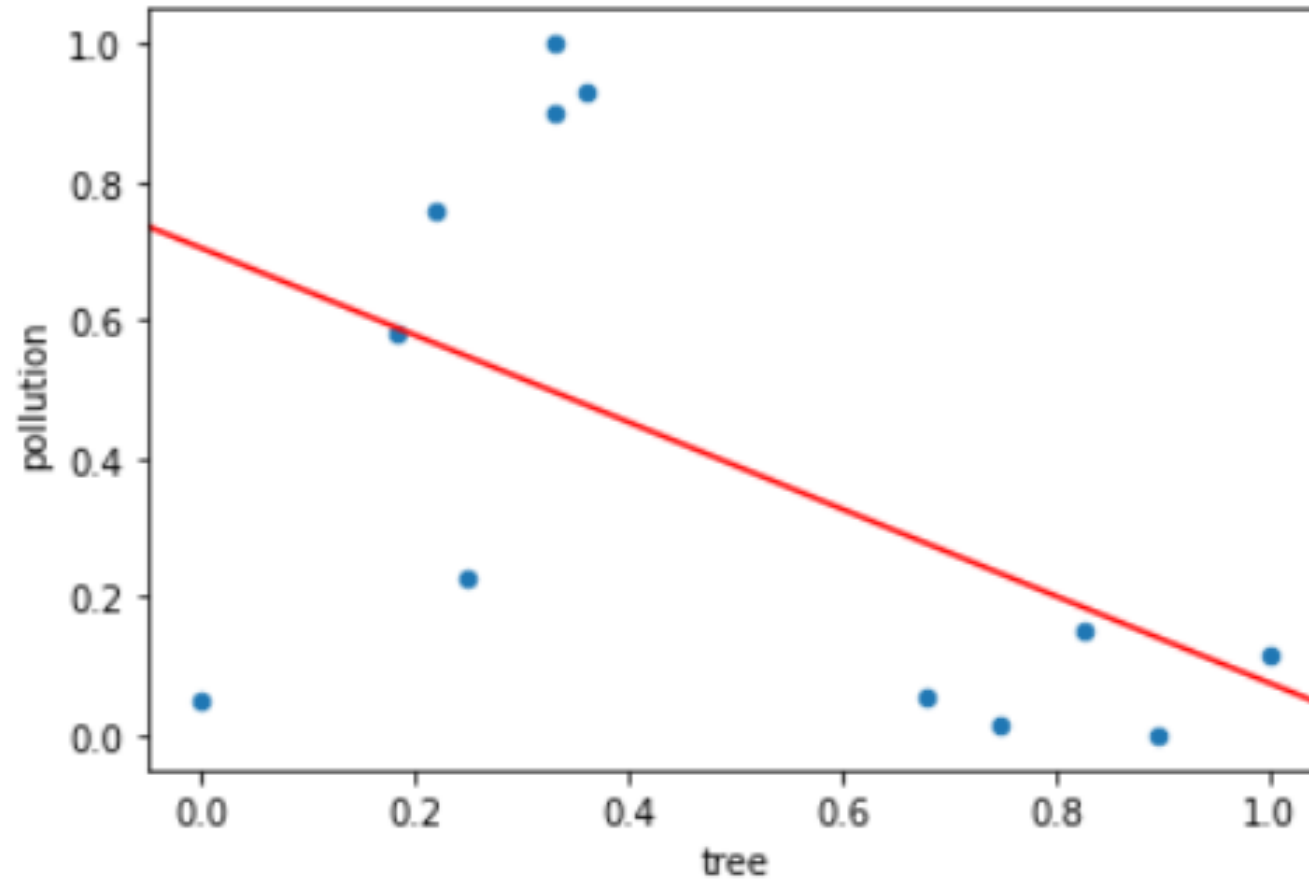


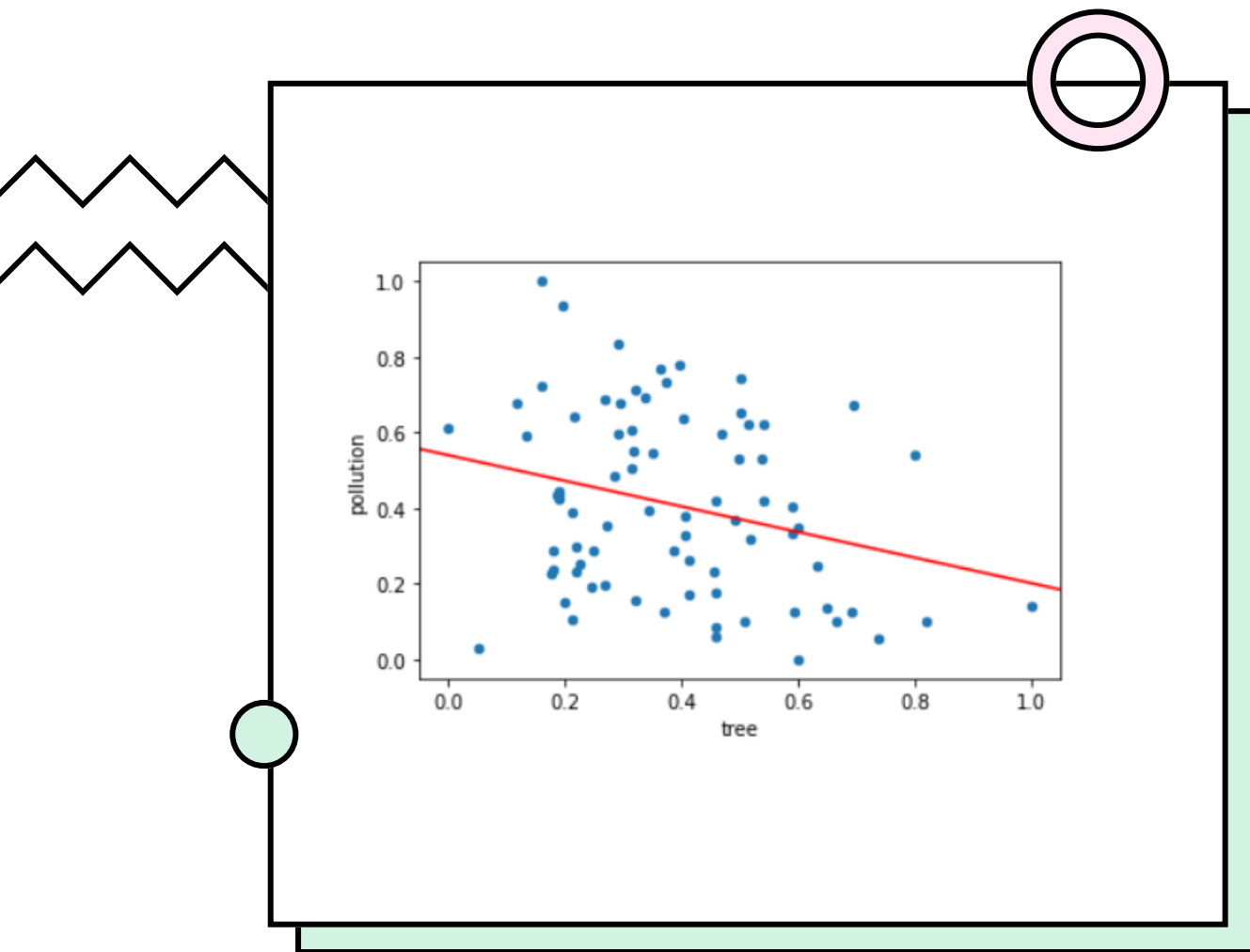
DATA ANALYSIS 1





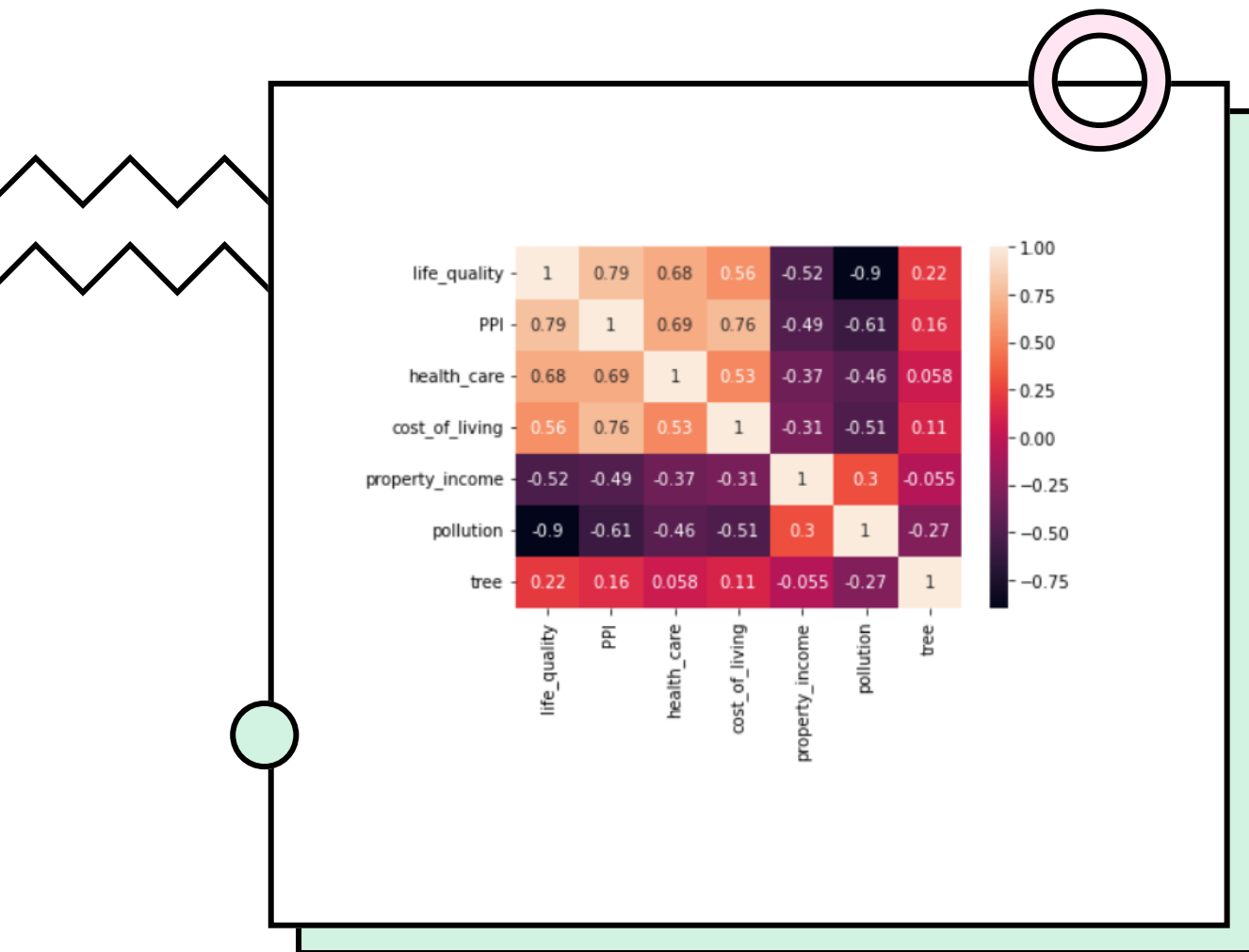
Linear Regression model





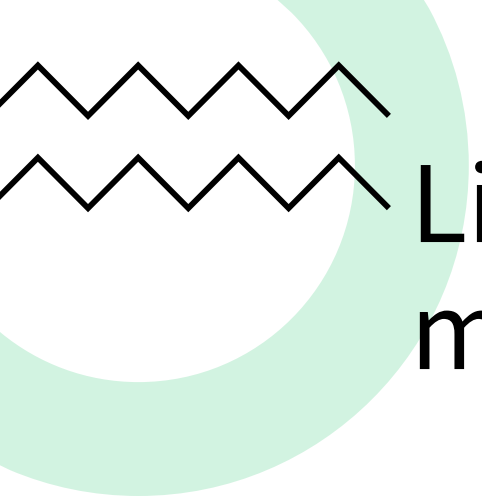
DATA ANALYSIS 2



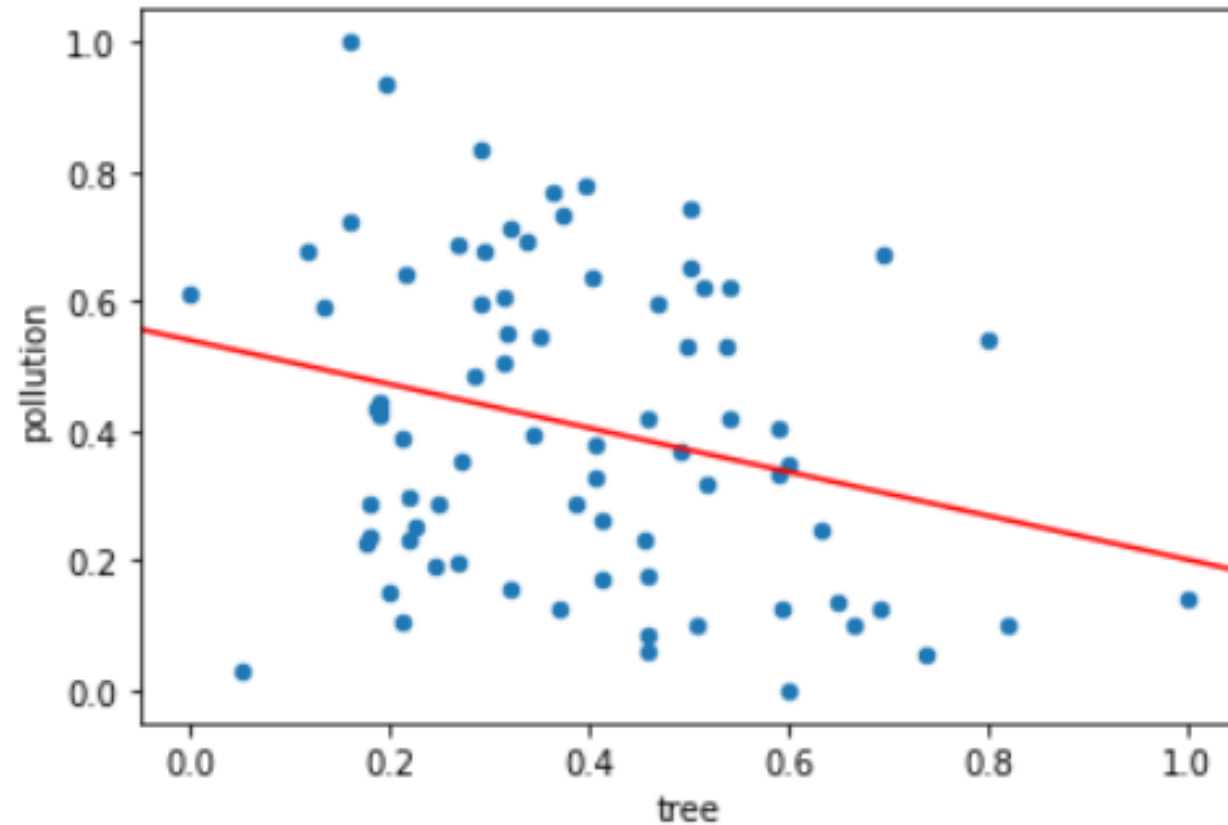


DATA ANALYSIS 2





Linear Regression model



Conclusion



- Positive social influence on various life quality factors
- Trees reduce air pollution
- Data-driven analysis of environmental and social effects will be necessary to guide the future market

**COME ON
PLANT A
TREE FOR
YOUR
COMPANY!**

