Time-Lapse Based Weather Classification

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Time-Lapse Based Weather Classification

Using time-lapse footage to infer weather and weather patterns in an area

- Day/night
- Cloud cover
- Weather “icon” (sun, snow, rain, cloudy, etc.)
- Precipitation
- Temperature

Taking pictures and gathering weather data using a Raspberry Pi and Forecast.io

Using a machine learning library to train a classifier

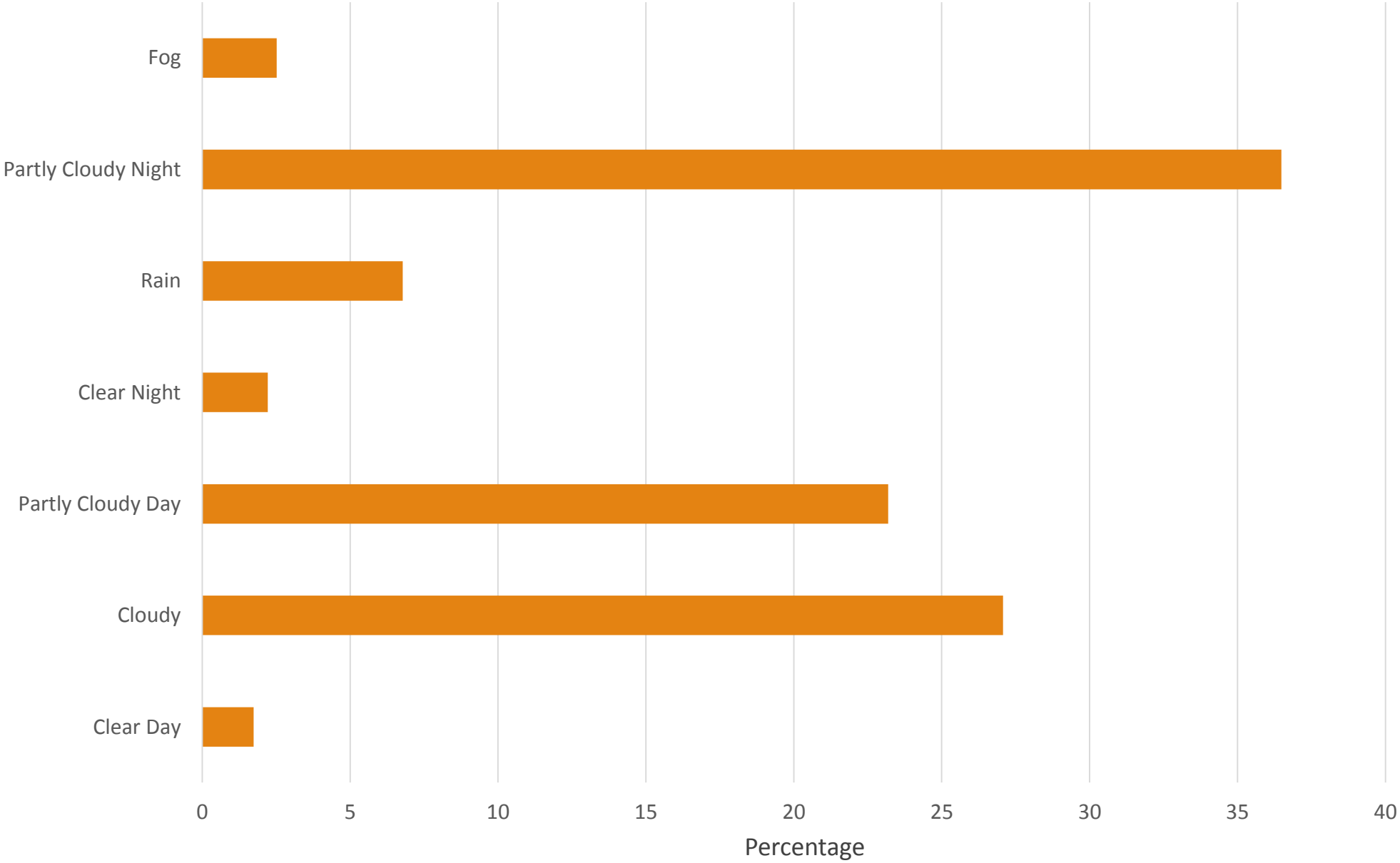
Data Gathering

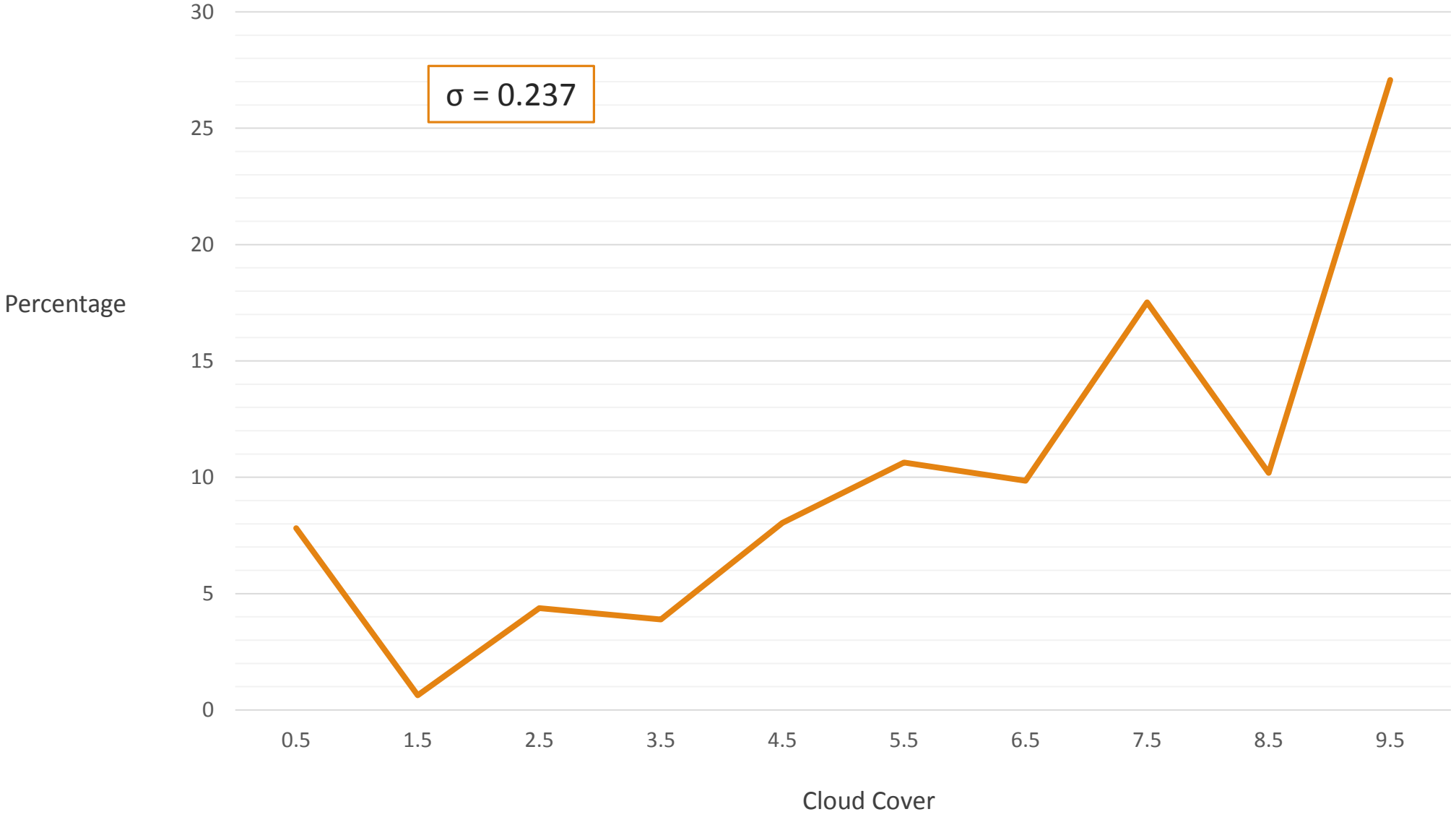
Taking pictures every 5 minutes

Currently at about 7000 data points

- Over three weeks of continuous footage

Concerns about data- specifically with how varied the weather was


Fog
Partly Cloudy Night
Rain
Clear Night
Partly Cloudy Day
Cloudy
Clear Day
0
5
10
15
20
25
30
35
40
Percentage


σ = 0.237
30
25
20
15
10
5
0
Percentage
0.5
1.5
2.5
3.5
4.5
5.5
6.5
7.5
8.5
9.5
Cloud Cover

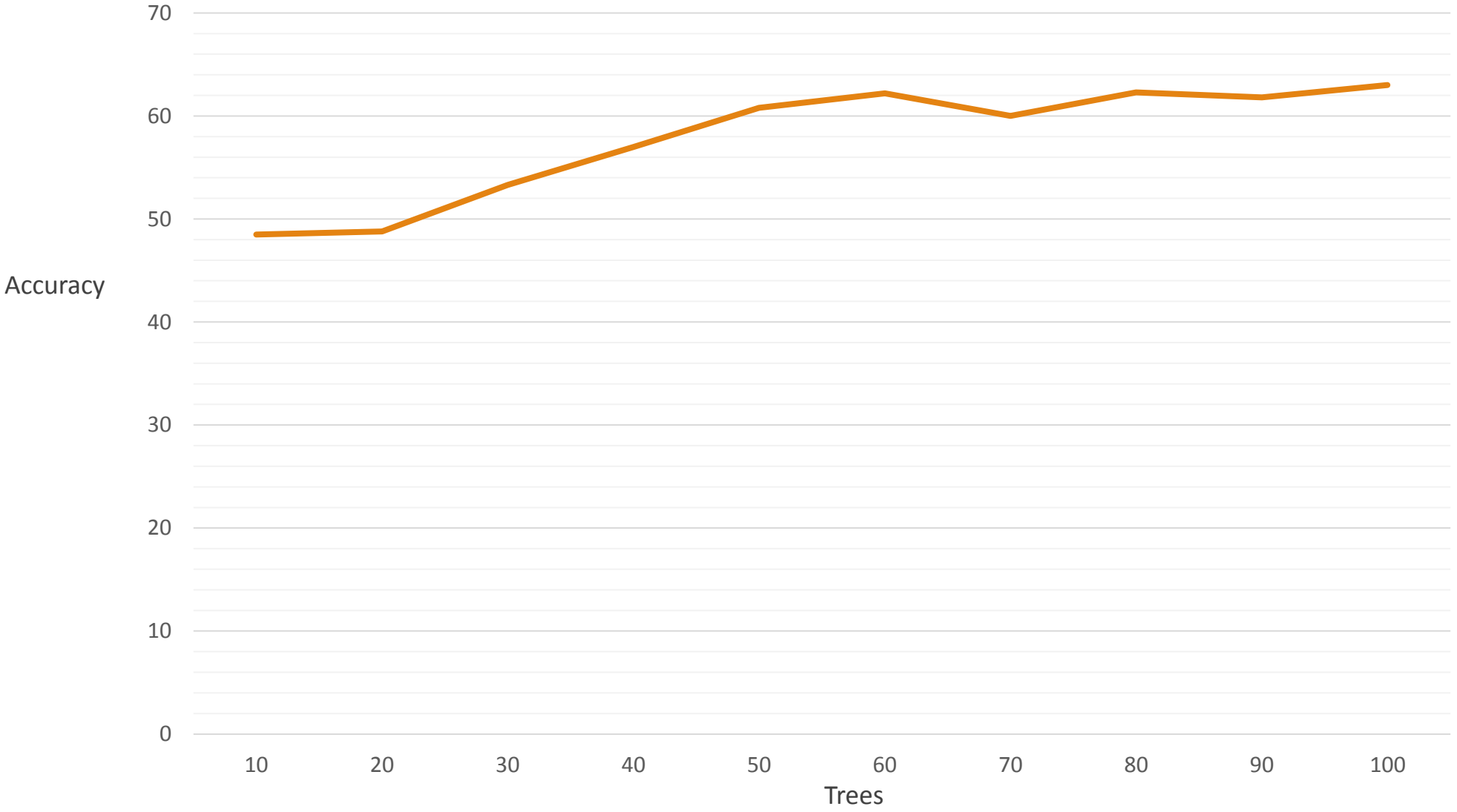
Classifying

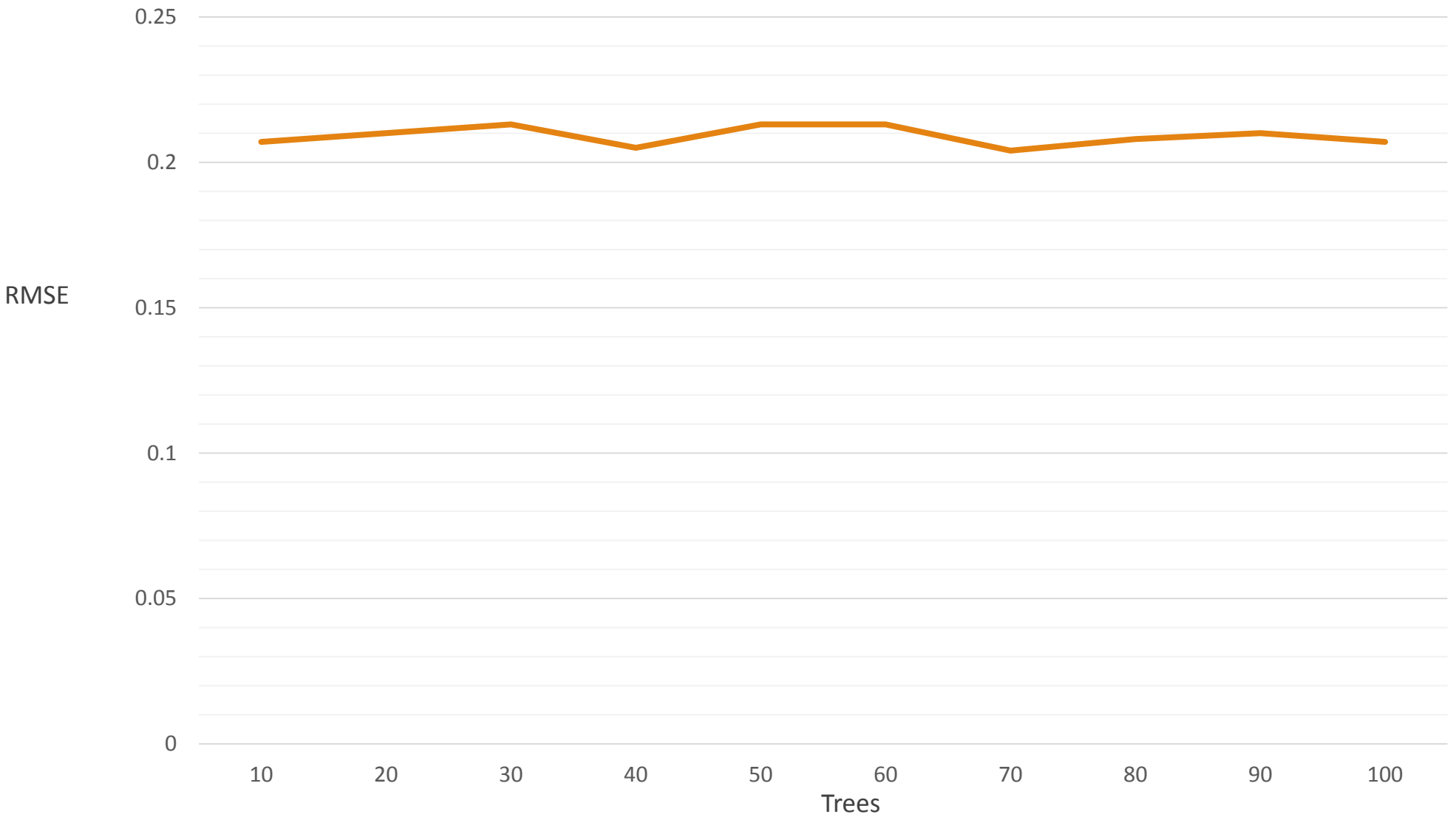
Using image metrics to train a classifier

Initially used a Random Forest with 10 trees

Icon Prediction Accuracy
48.52%

Cloud Cover Root-Mean-Square Error
20.7%


70
60
50
40
30
20
10
0
Accuracy
10
20
30
40
50
60
70
80
90
100
Trees


RMSE
0.25
0.2
0.15
0.1
0.05
0
10
20
30
40
50
60
70
80
90
100
Trees

What Next

Testing different types of classifiers with different parameters

- J48 had a 30% accuracy for icon but a 0.135 standard deviation for cloud cover

Potentially:

- Trying different image properties
- Predicting the weather in the future based on past trends

Write the dissertation