Urban Parking

WWW.URBANPARKING.XYZ

Urban Parking App

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App Description

- What if there was something like google maps that could take you straight to an empty parking spot?
- Our technology aims to make parking easier for drivers and reduce urban congestion by keeping cars off the road
- We are building a mobile app that predicts regions with open parking based off historical data
- A user will be able to input a destination and other options such as a preferred walking distance and a route to the ideal parking location is calculated and displayed.
- Routes can prioritize time, parking cost and walking distance so the user gets the ideal directions for their situation
- Our solution uses predictive analytics to route users to areas with open parking. This will not only decrease the time the user has to spend driving, it will also alleviate bad city traffic and urban emmissionsz

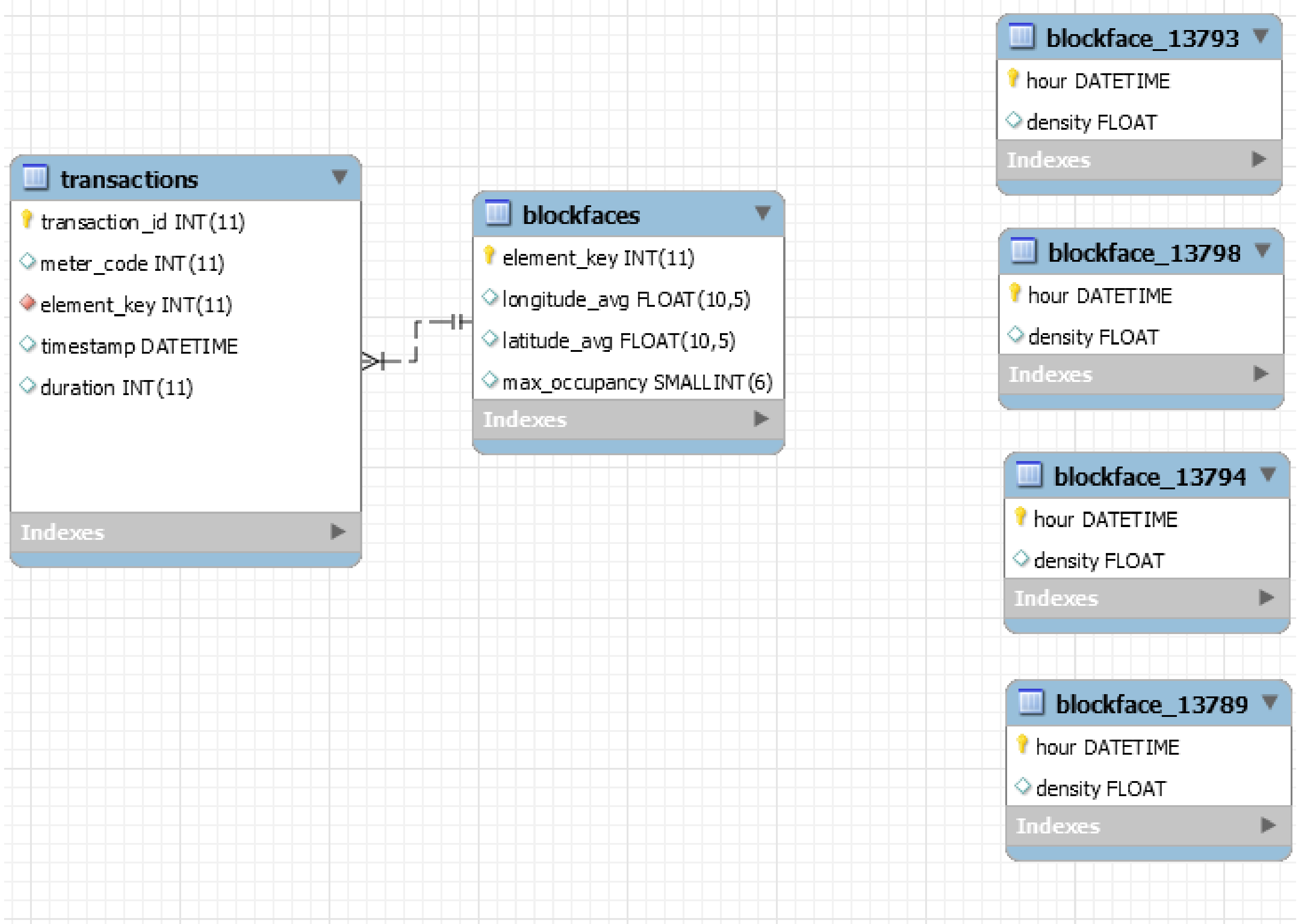
No one is attempting to solve this problem in the way that we are.

Back End

The framework is built using Flask and runs on an Amazon EC2 instance using Amazon's Elastic Beanstalk, serving a RESTful API to front end clients. Ultimately, this serves as an intermediary between the database and the front end. Using REST API means that the back end can support any front end client with an HTTP connection.

Raw transaction data, pay station information, analytics generated by the prediction algorithm, and other insights are stored in a MySQL database.

Database Schema:

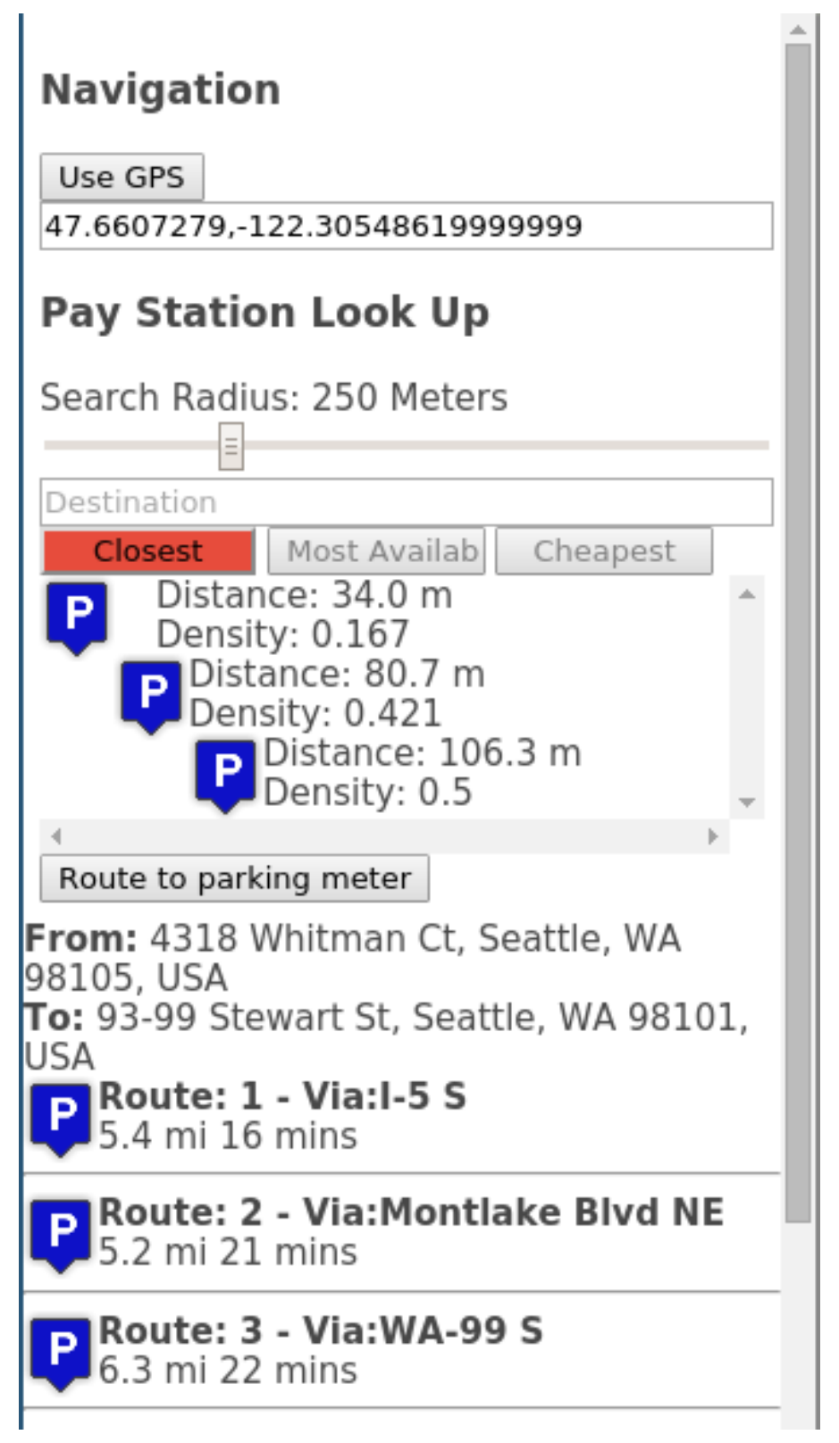


Powered by:

Flask learn HTML 5 CSS 3 JS android amazon web services

Web Front End

Navigation Menu:


Navigation

Use GPS

47.6607279,-122.30548619999999

Pay Station Look Up

Search Radius: 250 Meters

Destination

Closest | Most Availab | Cheapest

Distance: 34.0 m
Density: 0.167

Distance: 80.7 m
Density: 0.421

Distance: 106.3 m
Density: 0.5

Route to parking meter

From: 4318 Whitman Ct, Seattle, WA 98105, USA
To: 93-99 Stewart St, Seattle, WA 98101, USA

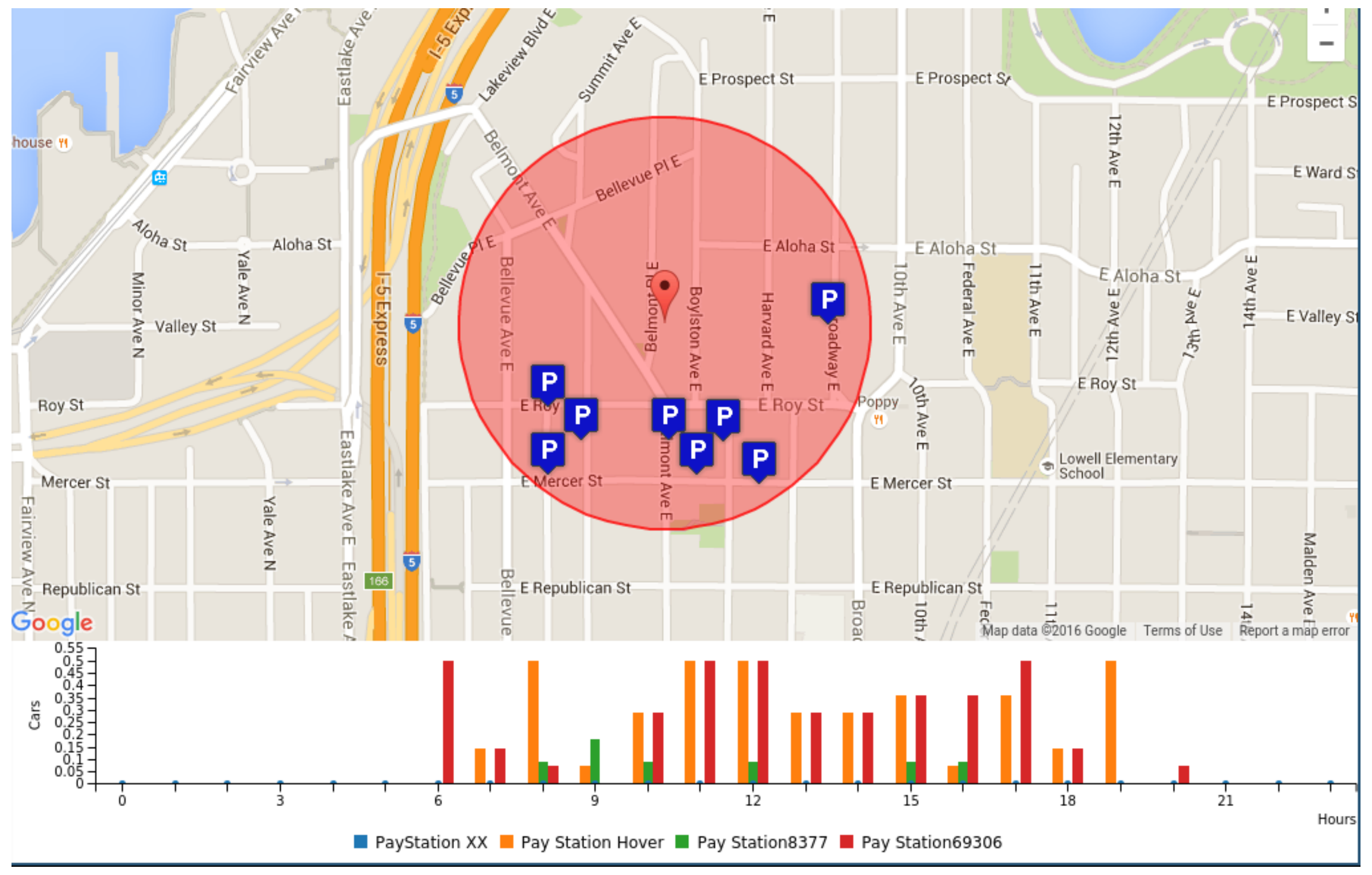
Route: 1 - Via:I-5 S
5.4 mi 16 mins

Route: 2 - Via:Montlake Blvd NE
5.2 mi 21 mins

Route: 3 - Via:WA-99 S
6.3 mi 22 mins

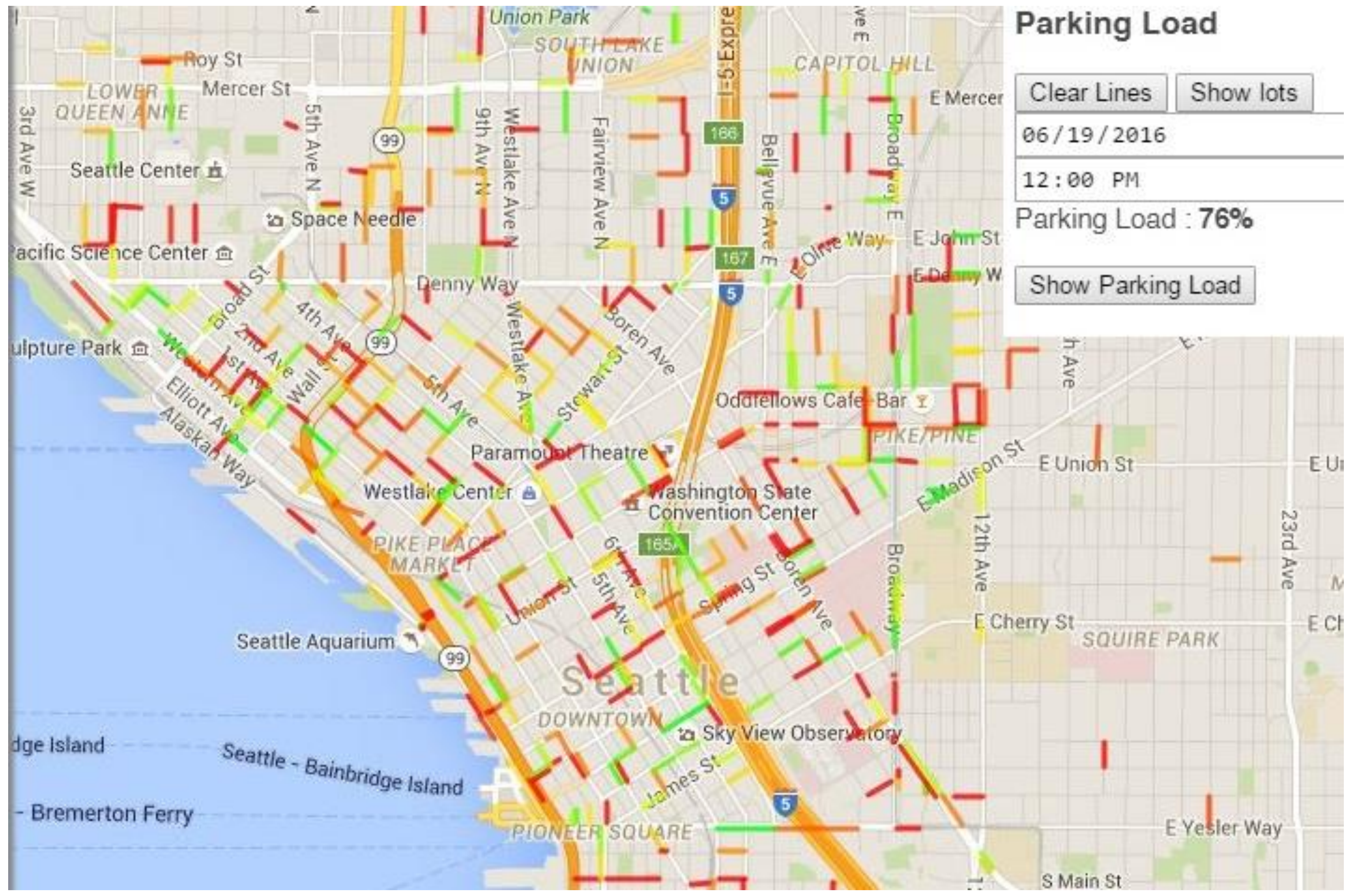
Local parking spot data:

Finds route, shows density histogram and closest parking to destination



Downtown prediction:

- Prediciton for June 19th 2016, 12:00 PM
- Streets are colored based of the prediction density
- Colors fade from RED = full to GREEN = empty


Parking Load

Clear Lines | Show lots

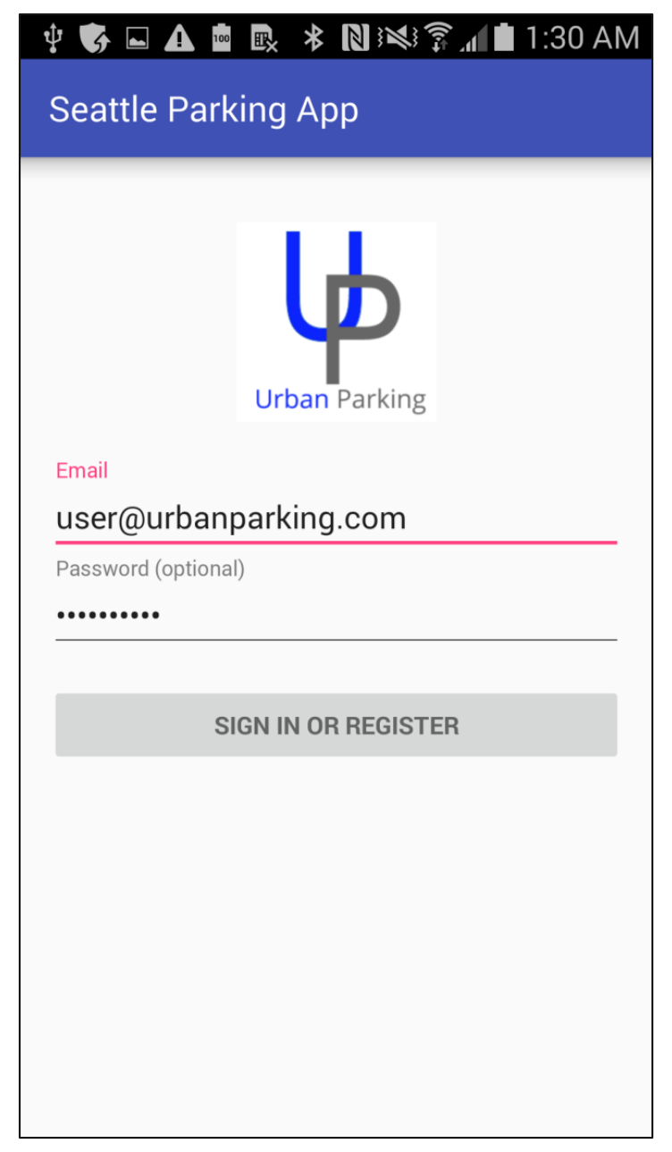
06/19/2016

12:00 PM

Parking Load : 76%

Show Parking Load

Mobile Front End

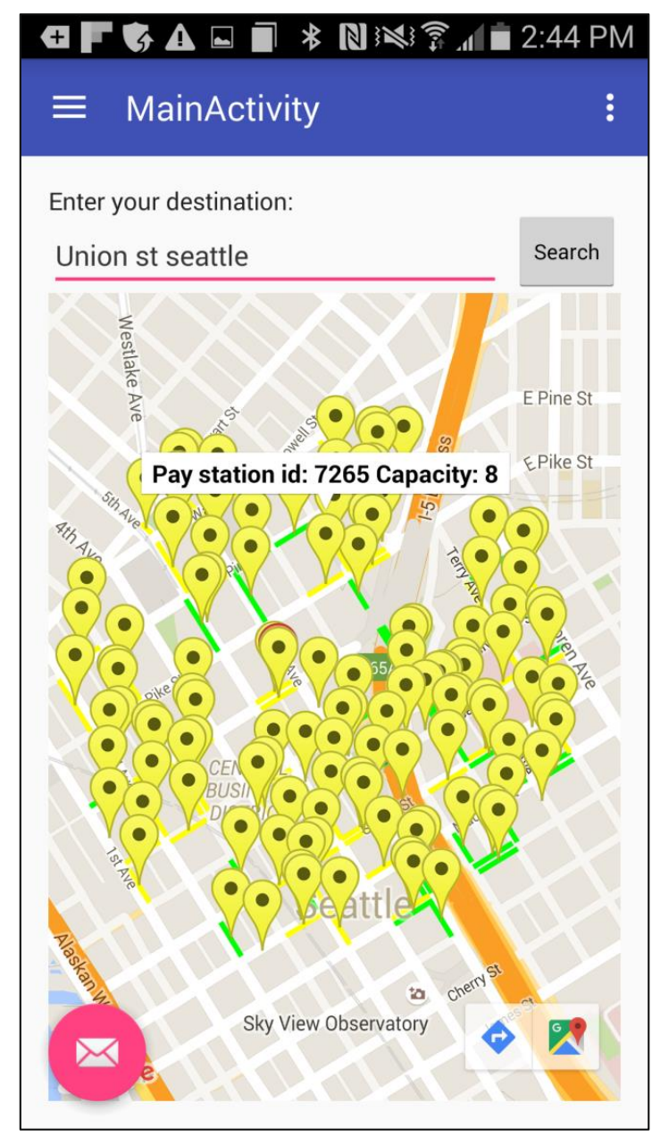

Seattle Parking App

Urban Parking

Email
user@urbanparking.com

Password (optional)

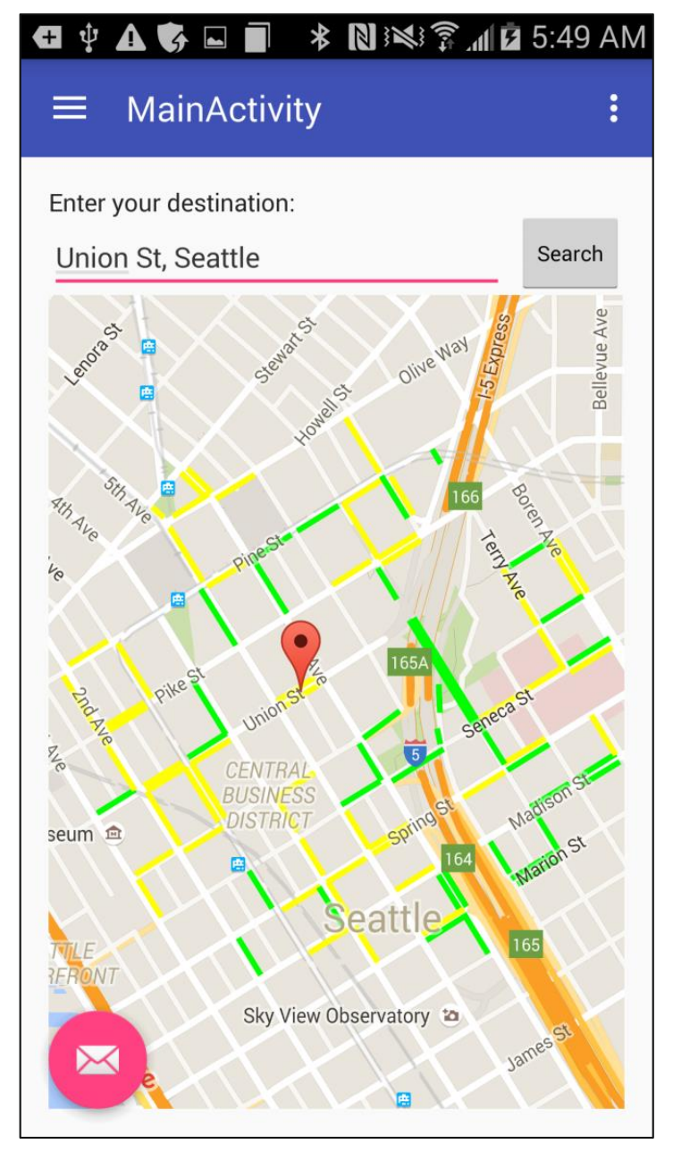
SIGN IN OR REGISTER


MainActivity

Enter your destination:

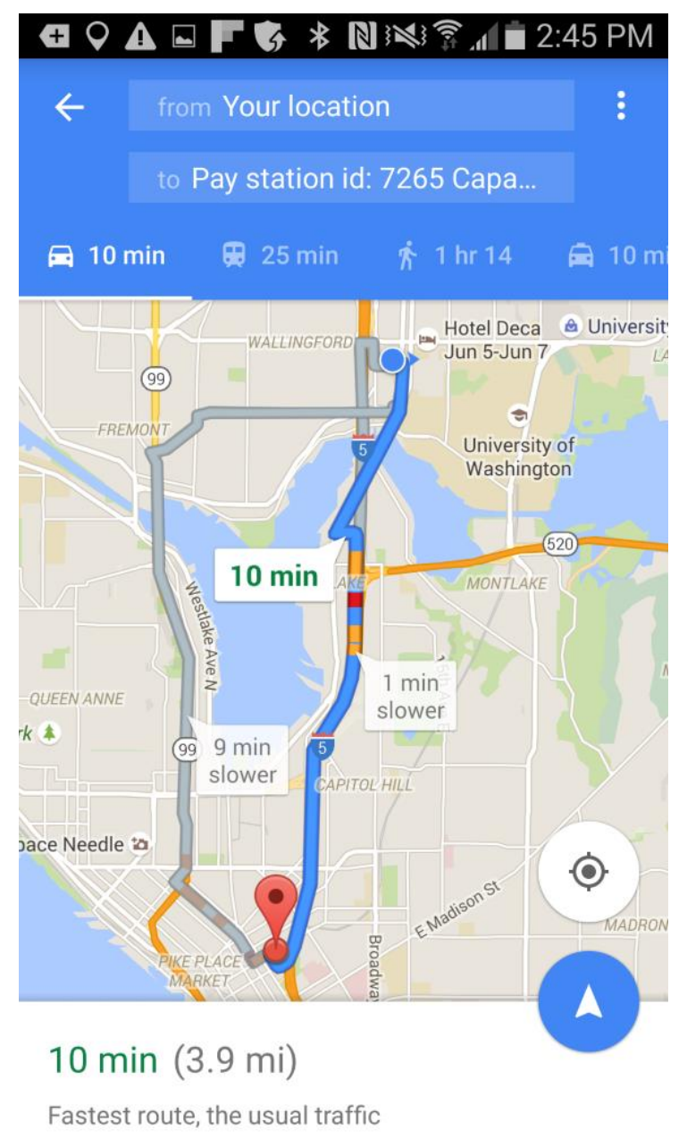
Union st seattle | Search

Pay station id: 7265 Capacity: 8


MainActivity

Enter your destination:

Union St, Seattle | Search


Your location

Pay station id: 7265 Capa...

10 min

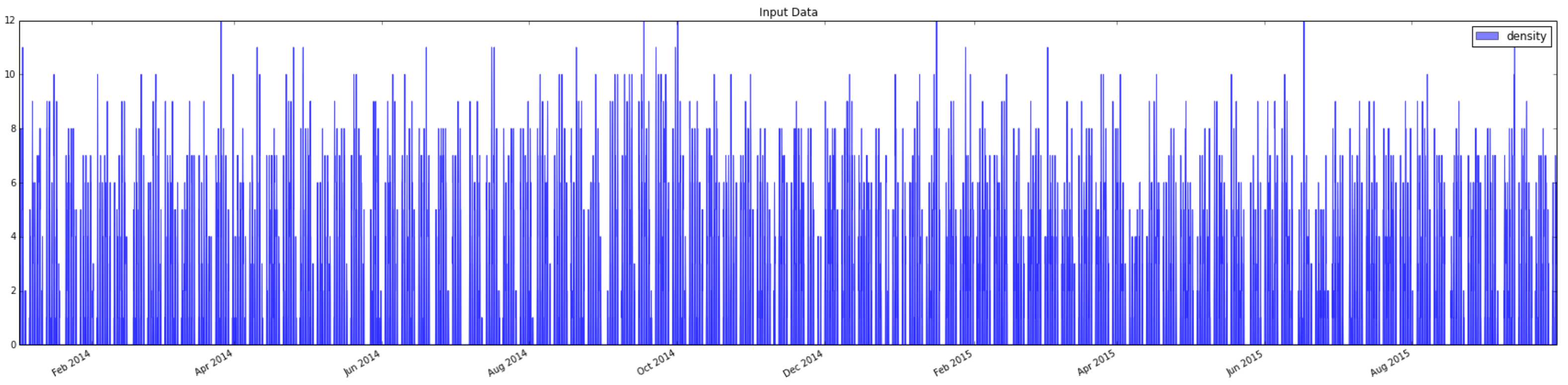
10 min (3.9 mi)

Fastest route, the usual traffic

Prediction Algorithm

Load data: data for single paystation from 2014 to 2016

Histogram with x axis being hourly date and y axis, number of transactions at paystation



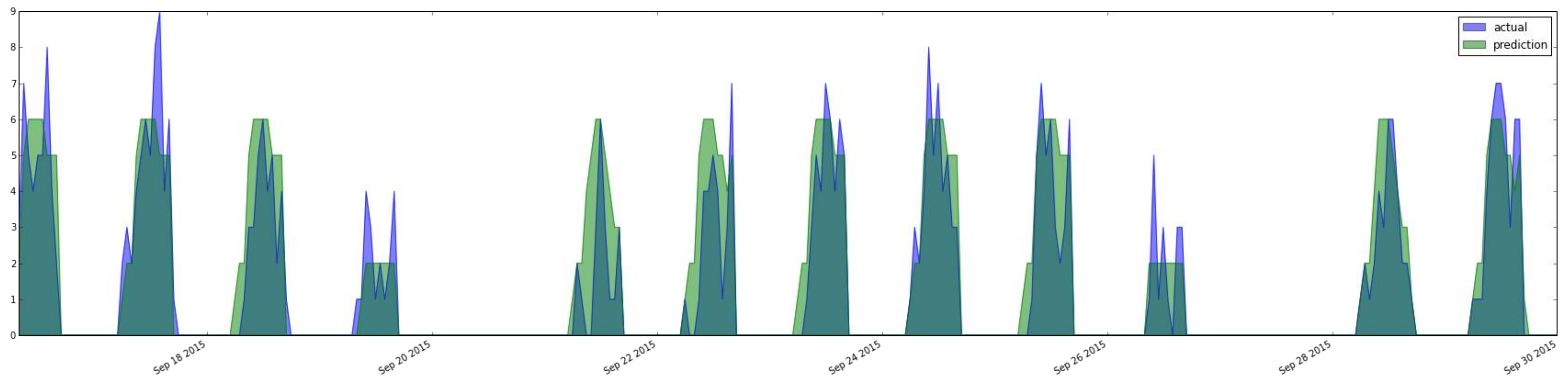
Predict: forecast 14 days of parking and overlay on actual data

Prediction based of following features:

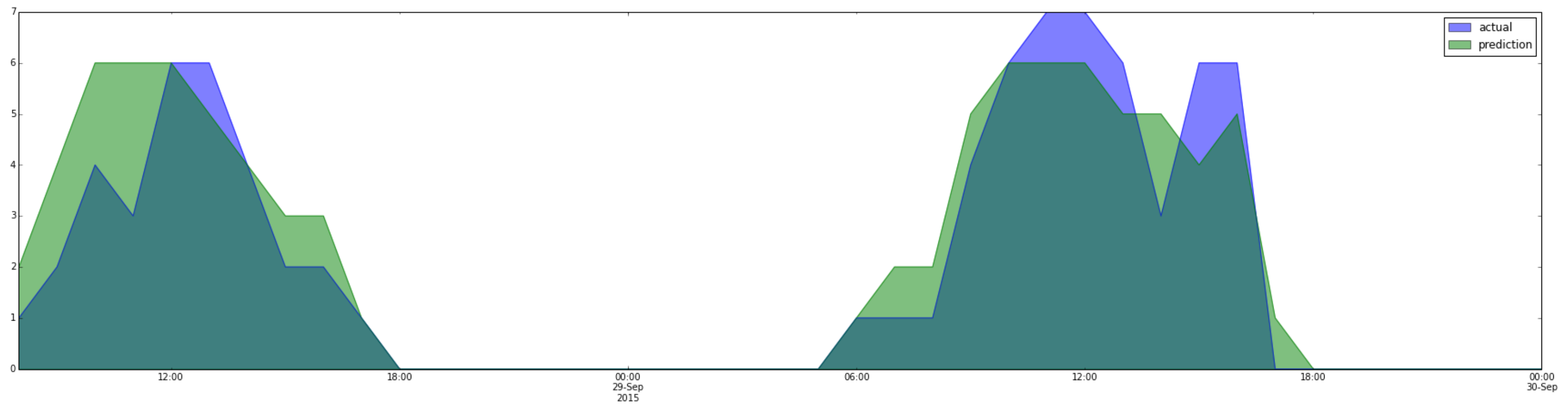
- Month (1 to 12), Weekday (1 to 7), Hour (0 to 24), Daily Rain (inches), Daily Mean Temp (F)

Gradient Boosting Paramaters:

- *learning_rate* = 0.1, *n_estimators* = 100, *alphas* = 0.95, *depth* = 6, *loss* = huber



Zoomed in on two forecasted days



Analyze results:

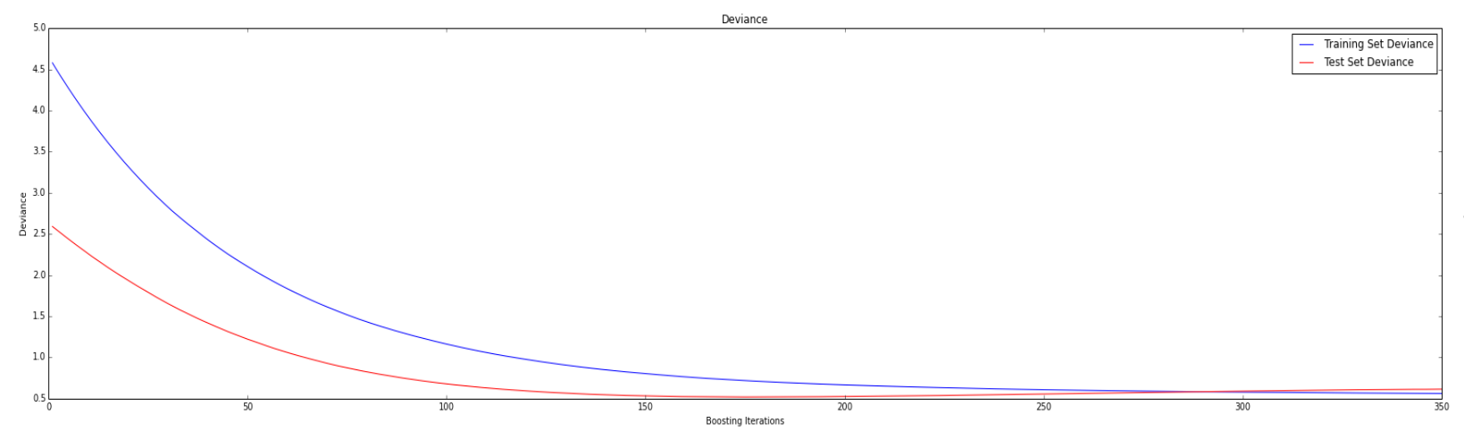
14 Day Forcast Error: Mean Square Error = 1.26, R2 = 0.60

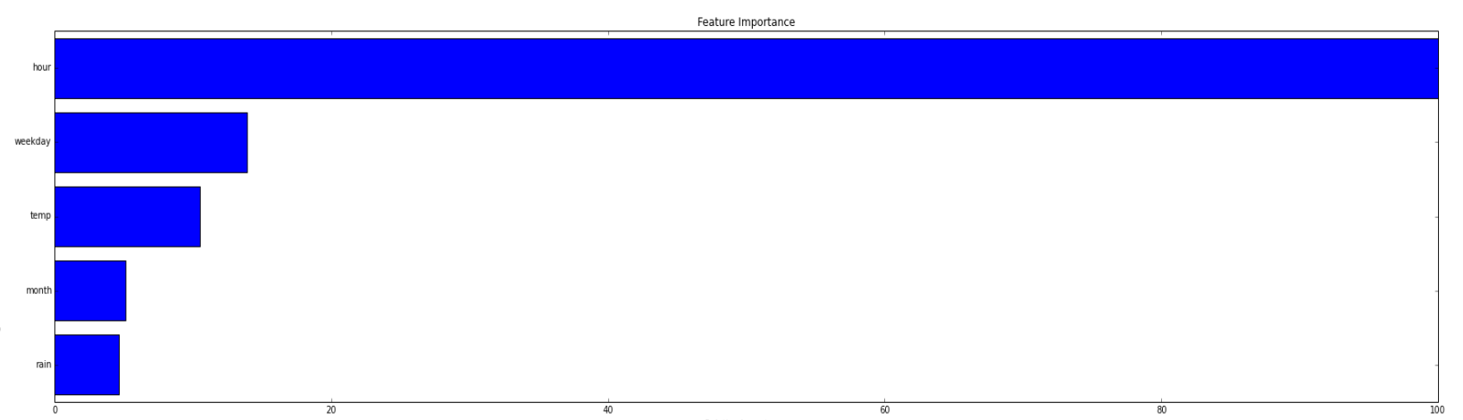
Prediction Convergence:

Shows required iterations for convergence, based off *learning_rate* and *n_estimators*

Feature Importance:

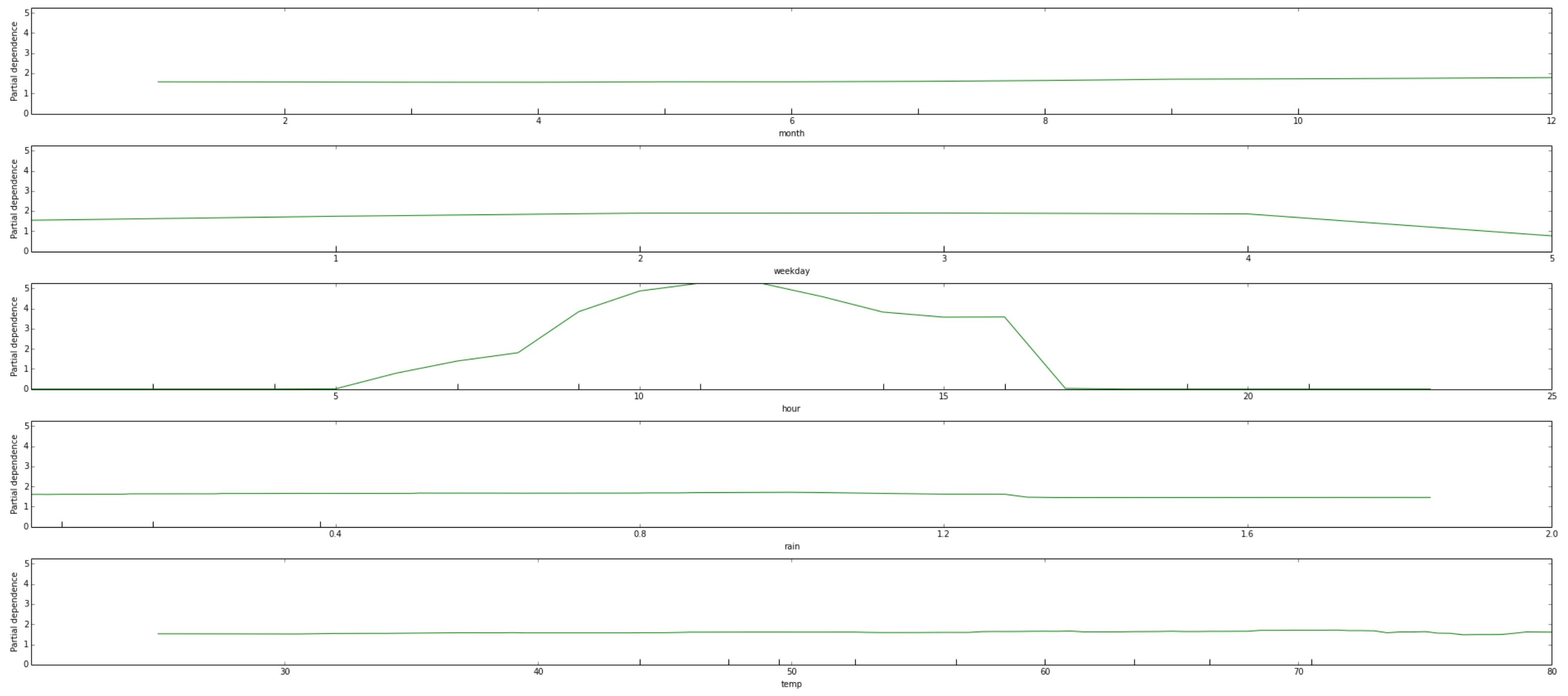
Shows which features have most prediction impact





Feature Dependence:

Shows which values of each feature contribute to parking load


month
weekday
hour
rain
temp