PROS Intern Hackathon 2019

Lev raging Data with AI to Dynamically Recommend Price

Arman Khondker, Forrest Bundrick,
Rita Bechara, Yuanyuan Liu

July 8th, 2019

PROS.

The Team

Arman Khondker

Product Development Intern

Rita Bechara

Professional Services B2B Intern

Forrest Bundrick

Professional Services Travel Intern

Yara Liu

Science Intern

“

Develop a prototype of a solution for a customer need, that uses AI to find meaning in the data.

Hackathon Organizers

Some Guy(s) at PROS

PROS.

Agenda

Customer Need

Our Solution

Technical Implementation

Moving Forward

Customer Need

PROS.

Customer Need

- Technology prices (laptops) does not completely reflect market value for consumers
- Historical data is not effective
- A solution that reflects consumer trends and product evolution would create more effective pricing strategy

Our Vision

Provide companies with a pricing recommendation solution that uses Artificial Intelligence to take into account historical data, internet search trends and consumer sentiments

PROS.

Solution Implementation

PROS.

High Level Solution Overview

- Price Forecasting Model
- Search Trends Data
- Public Sentiment Data
- Flask Application

Pricing Model Features

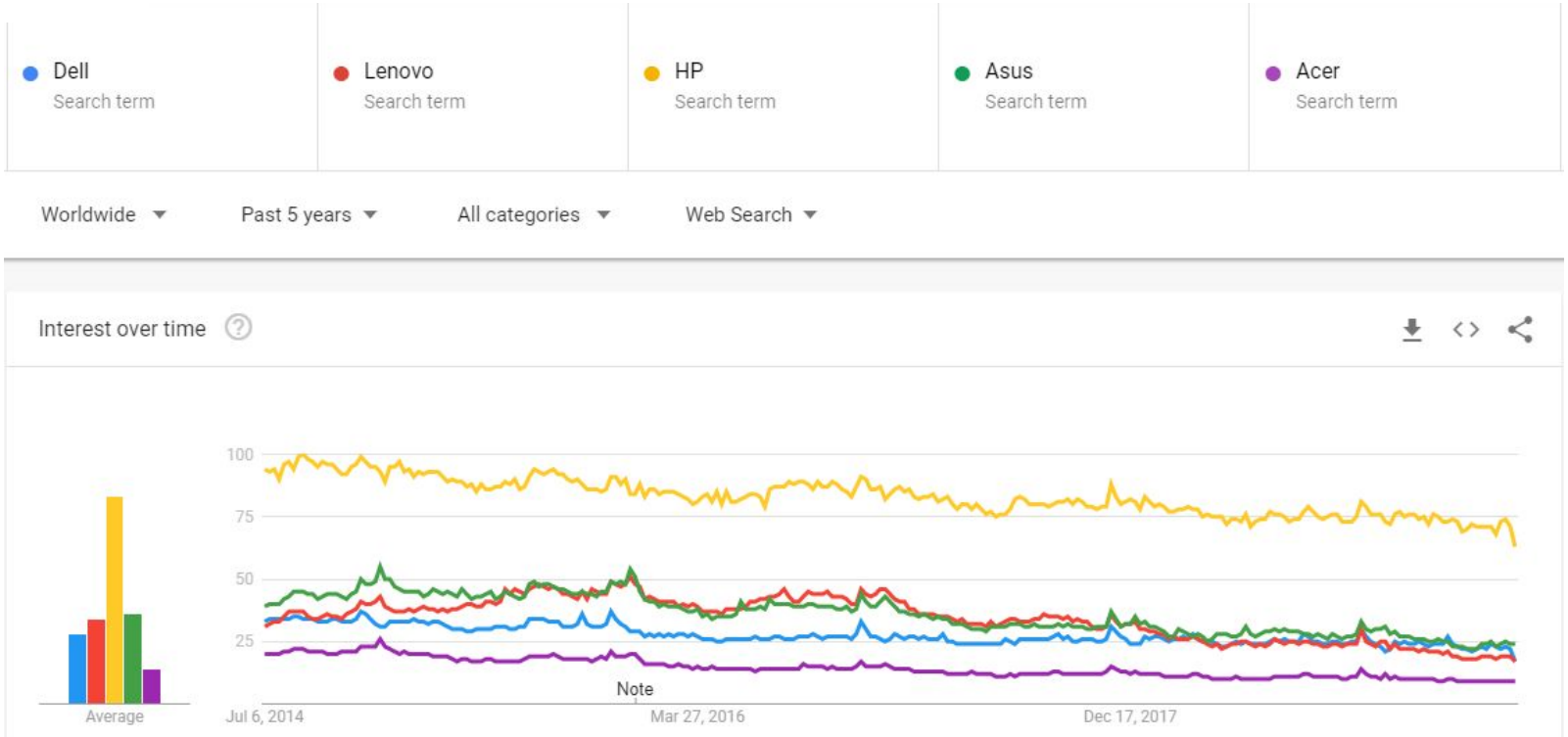
PROS.


Google Trends

Using Google to Leverage Search Queries

- Google Search traffic data allows us to gain insights into interest in products
- Given Google Search data we can draw conclusions about brand awareness and website traffic over time
- This allows the creation of more accurate forecasting and responsive pricing

Data Collection



Public Sentiment Analysis

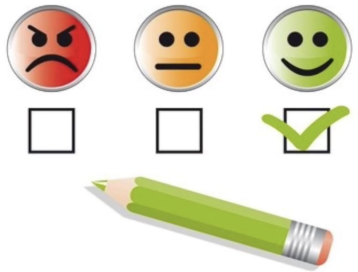
PROS.

What is Public Sentiment Analysis?

- Opinion Mining, Emotion AI
- Use of natural language processing to measure consumer attitudes, opinions, and emotions expressed online

Why Public Sentiment Analysis?

- Abundance of global public sentiment data widely available
- Gain insights into consumer psychology and feelings to help price our products better
- Allows us to analyze millions of dynamic text snippets in seconds with AI



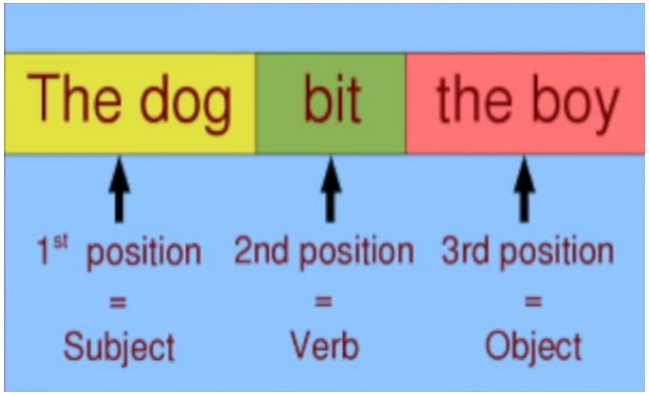

twitter

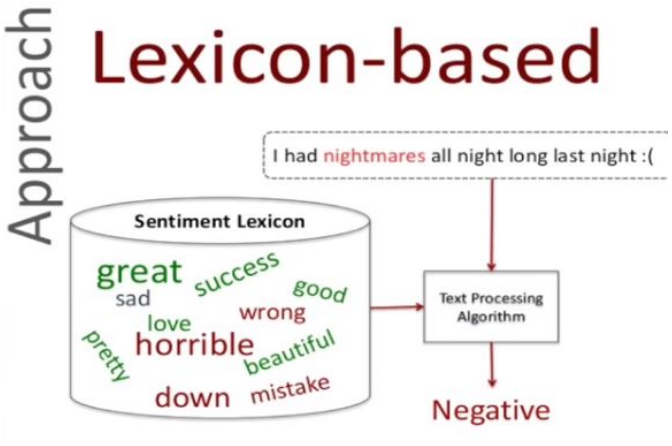
Using twitter to Leverage Public Sentiment

- Apply for Twitter Developer Account
- Python Bot to parse Tweets on laptop brands
- Install proper dependencies
- Tweepy API
- NLTK (Natural Language Toolkit) to classify tweets
- Feed our results to our price forecasting model

Using the twitter Tweepy API and NLTK

- 1. Retrieve Input Text (Tweet)
- 2. Use “tokenization” to split tweet
- 3. Use Natural Language Toolkit to look up sentiment value of each token
- 4. Get total sentiment score of tweet





Sentiment Score Example

+1

-1

Subjectivity Score Example

+1

-1

Machine Learning Model Results

PROS.

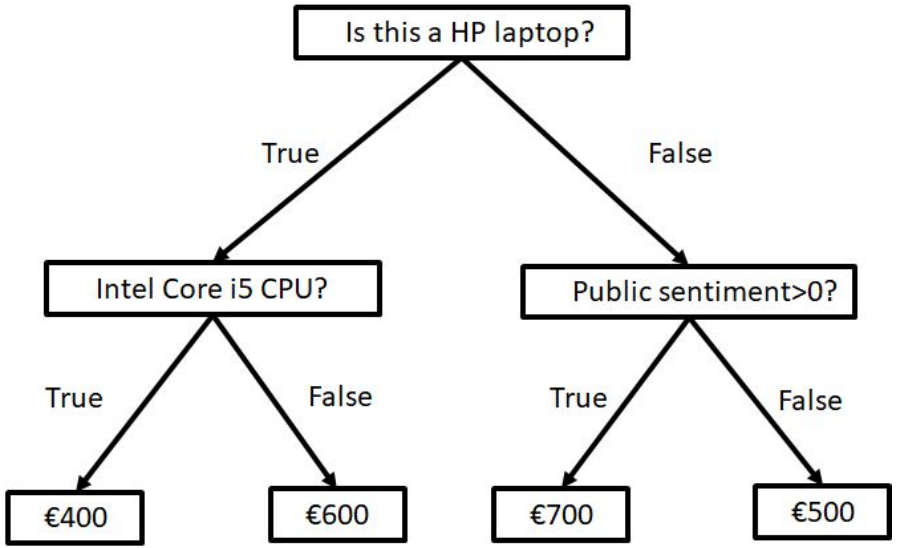
Forecasting Model Details

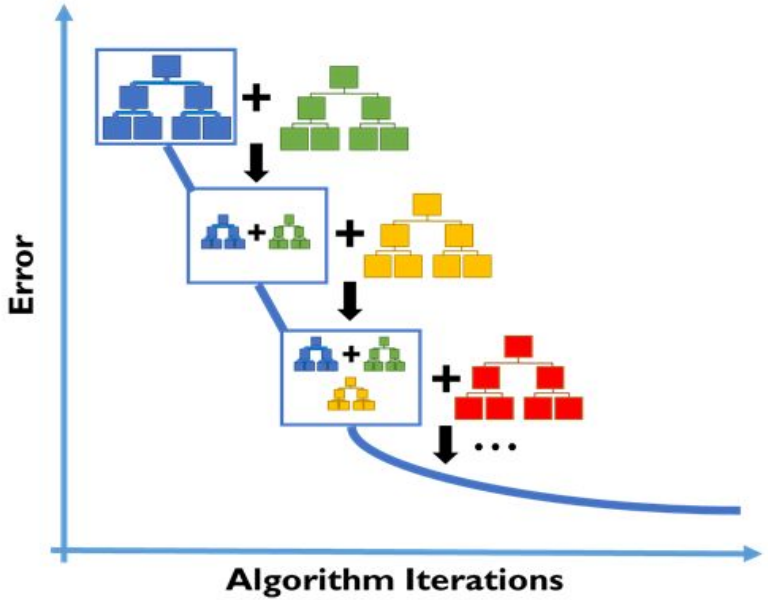
- Dataset: Includes characteristics and prices for 1300+ laptops
- Features: Brand, Screen size, Screen resolution, CPU, RAM, Memory, GPU, Operating system, Weight, Public sentiment, Search trends
- Target: Price in Euros

Input Data Format

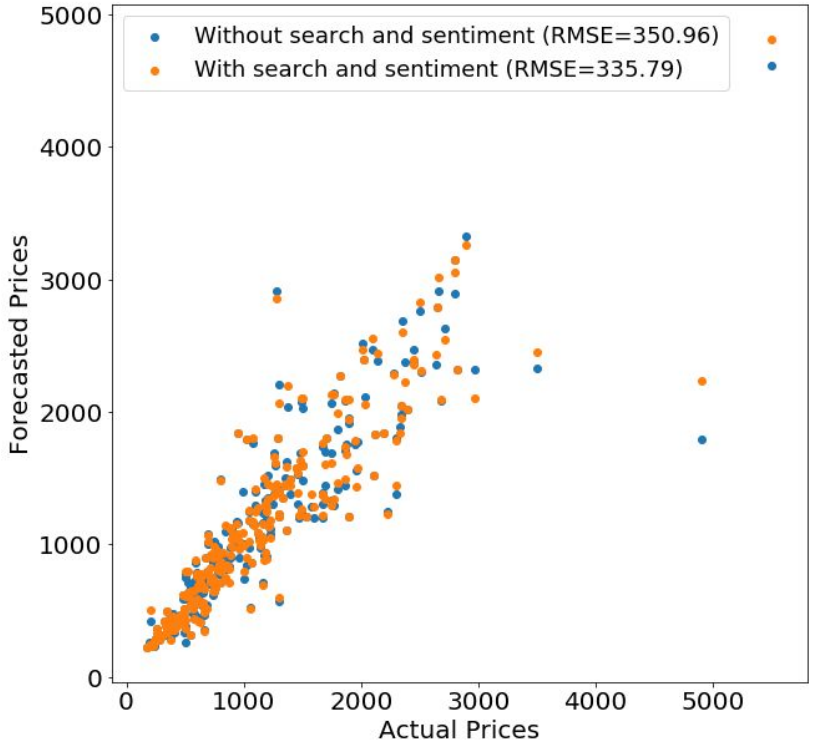
Company	TypeNam	Inches	ScreenRes	Cpu	Ram	Memory	Gpu	OpSys	Weight	Price_euros	Google_interest	Twitter_Sentiment	Twitter_Subjectivity
Asus	Ultrabook	14	Full HD	Intel Core	16GB	512GB	Nvidia	Windows	1.3	1495	35.09578544	0.078535795	0.359130208
Acer	Ultrabook	14	Full HD	Intel Core	8GB	256GB	Intel	Windows	1.6	770	14.11111111	0.143282429	0.25438783
Dell	Notebook	15.6	Full HD	Intel Core	8GB	256GB	AMD	Windows	2.2	745	26.98084291	0.129559323	0.335582602
Dell	Ultrabook	13.3	Full HD	Intel Core	8GB	128GB	Intel	Windows	1.22	979	26.98084291	0.129559323	0.335582602
Lenovo	Gaming	15.6	Full HD	Intel Core	8GB	128GB	Nvidia	Windows	2.5	999	33.49425287	0.070627298	0.256155561
Dell	2 in 1 Con	13.3	Full HD	Intel Core	8GB	256GB	Intel	Windows	1.62	819	26.98084291	0.129559323	0.335582602
HP	Ultrabook	15.6	Full HD	Intel Core	8GB	256GB	Intel	Windows	1.91	659	81.17241379	0.195173616	0.364241209
Dell	Notebook	15.6	Full HD	Intel Core	8GB	256GB	AMD	Windows	2.2	800	26.98084291	0.129559323	0.335582602
Dell	Ultrabook	15.6	Full HD	Intel Core	8GB	256GB	Intel	Windows	1.88	1298	26.98084291	0.129559323	0.335582602
HP	Notebook	17.3	Full HD	Intel Core	8GB	1TB	Nvidia	Windows	2.5	896	81.17241379	0.195173616	0.364241209
Dell	Notebook	17.3	Full HD	Intel Core	8GB	128GB	AMD	Windows	2.8	979	26.98084291	0.129559323	0.335582602
HP	Notebook	15.6	Full HD	Intel Core	8GB	256GB	Nvidia	Windows	2.1	879	81.17241379	0.195173616	0.364241209
Dell	Gaming	15.6	Full HD	Intel Core	16GB	256GB	Nvidia	Windows	2.65	1499	26.98084291	0.129559323	0.335582602
Acer	Notebook	15.6	Full HD	Intel Core	4GB	256GB	Intel	Windows	2.2	682	14.11111111	0.143282429	0.25438783
Dell	2 in 1 Con	17.3	Full HD	Intel Core	12GB	1TB	Nvidia	Windows	2.77	999	26.98084291	0.129559323	0.335582602
Dell	Notebook	15.6	Full HD	Intel Core	4GB	256GB	AMD	Windows	2.3	639	26.98084291	0.129559323	0.335582602
Acer	Notebook	15.6	Full HD	Intel Core	8GB	256GB	Nvidia	Windows	2.2	841	14.11111111	0.143282429	0.25438783
HP	Notebook	13.3	Full HD	Intel Core	8GB	512GB	Intel	Windows	1.49	1103	81.17241379	0.195173616	0.364241209

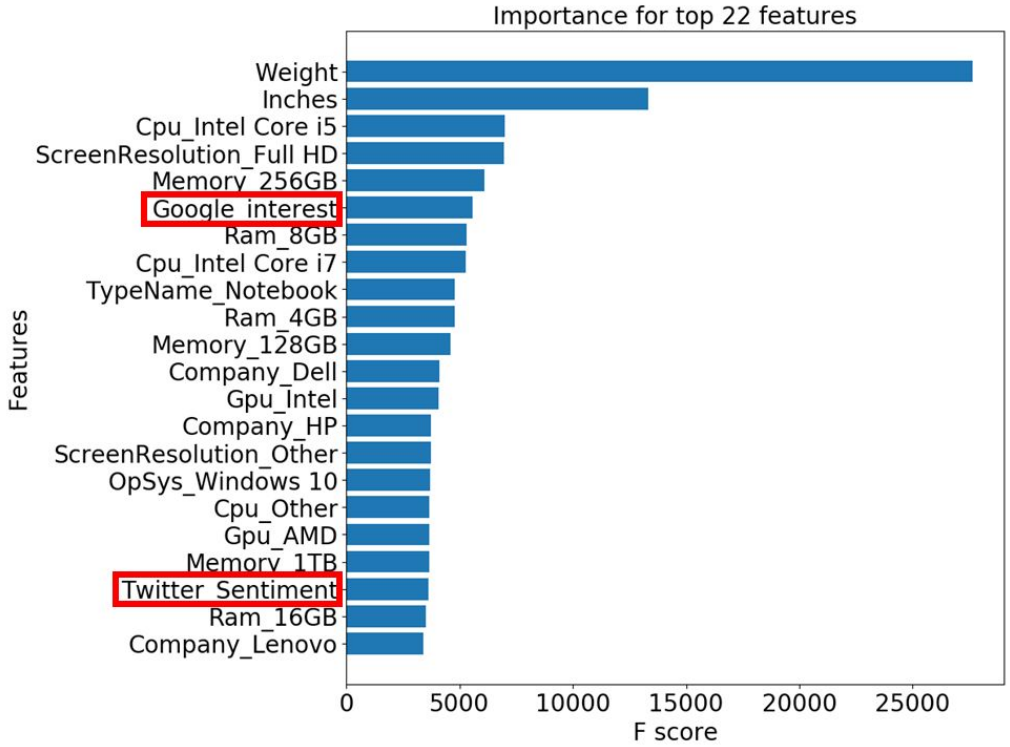
Gradient Boosting Regression





Forecasting Performance





Demonstration

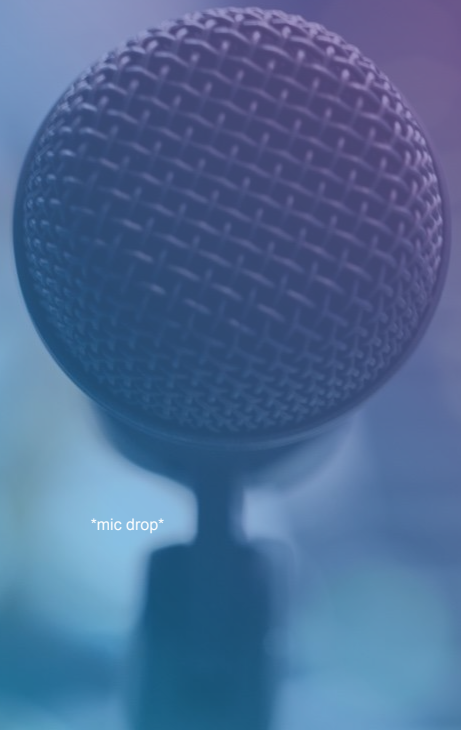
Moving Forward

Moving Forward - Solution Improvements

- Implement REST API to display model price recommendation to UI
- Enhance our current machine learning model to include more features
- Improve twitter bot to filter spam

Applications

Wrapping Up



- Dynamic Pricing Solution
- Google Trends Data
- Twitter Sentiment Analysis
- Python Tweet Bot
- Price Forecasting Model
- Flask Application

Thank You!

Questions?

PROS.