Predicting Gentrification Using Machine Learning

Neighborhood Characteristics Before Gentrification

- Older Housing Stock
- Long-time Residents
- High Racial Diversity
- Low Income
- High Percent of Rentals
- Use of Public Transportation

Gentrification In Progress

- Investment Comes Into Neighborhood
  - New Housing
  - New Upscale Businesses
  - Investment in new public transportation (i.e. Light Rail Systems)
- Area Becomes More Desirable To Higher Income Buyers
- Rents Increase – Low Income Residents Get Displaced

Capture What's Happening in Neighborhood via 6 Socio-Economic Indicators (X1-X6)

We take a snapshot of the data in Year 2000 and again 10 years later to compute the % Change in each factor.

X Features (Timeframe 2000>2010)

- X1 - Percent Change in Rental Price
- X2 - Percent Change in Caucasian Resident
- X3 - Percent Change in Median Income
- X4 – Percent Change in Use of Public Transportation
- X5 – Present Change in Education Level

Additional Features Under Consideration

- X6 - Percent Change in Median Home Price

Sample X Features from Dataframe

	Average Education Index 2000	Average Education Index 2014	Index Change	Median Cost for House 2000	Median Cost for House 2014	Change in Cost for House	Median Income 2000	Median Income 2014	Income Change	Median Rent 2000	...	Take Public Transp % in 2000	Take Public Transp % in 2014
zip													
94305	17.76	17.69	-0.07	3089.0	4001.0	912.0	41313.0	51976.0	10663.0	843.0	...	0.020	0.034
94708	17.01	17.12	0.11	2407.0	3410.0	1003.0	103791.0	145610.0	41819.0	1527.0	...	0.131	0.157
94304	17.00	17.02	0.02	3250.0	4001.0	751.0	77539.0	101932.0	24393.0	1948.0	...	0.032	0.046
94707	16.83	17.15	0.32	2190.0	3201.0	1011.0	100590.0	136331.0	35741.0	1076.0	...	0.142	0.203
94709	16.61	16.83	0.22	1989.0	2485.0	496.0	38613.0	59150.0	20537.0	807.0	...	0.193	0.189

5 rows × 22 columns

Gentrified Neighborhoods Follow Patterns

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Additional Features Under Consideration

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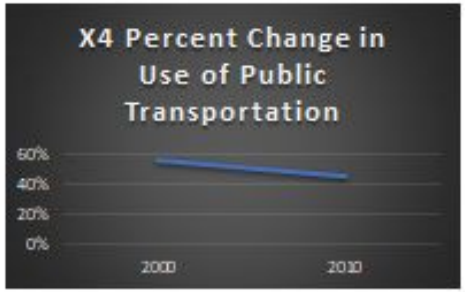
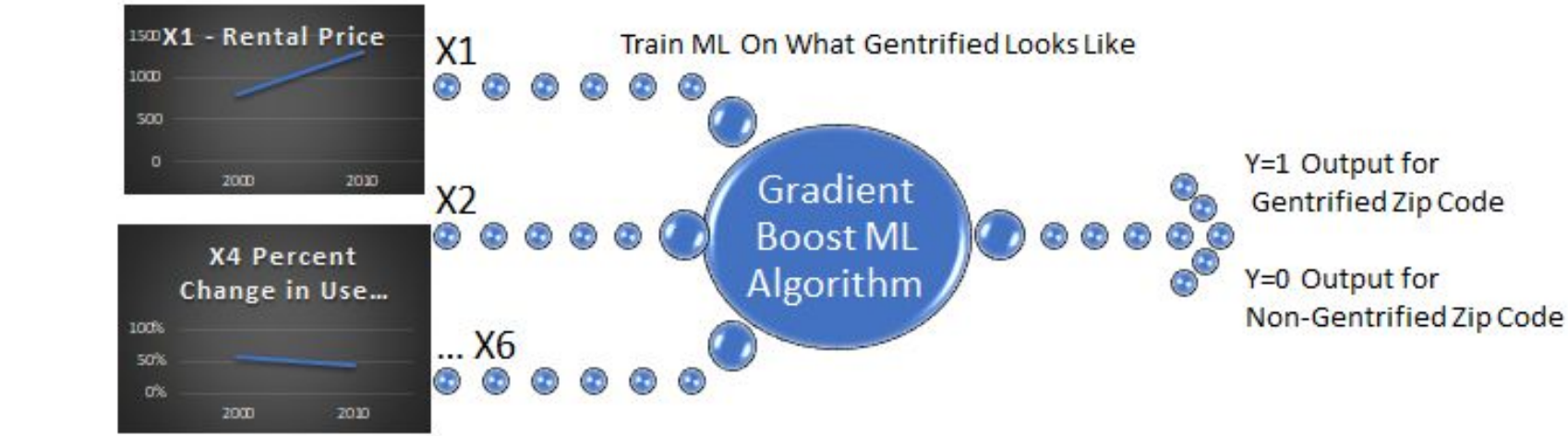


Training the Model

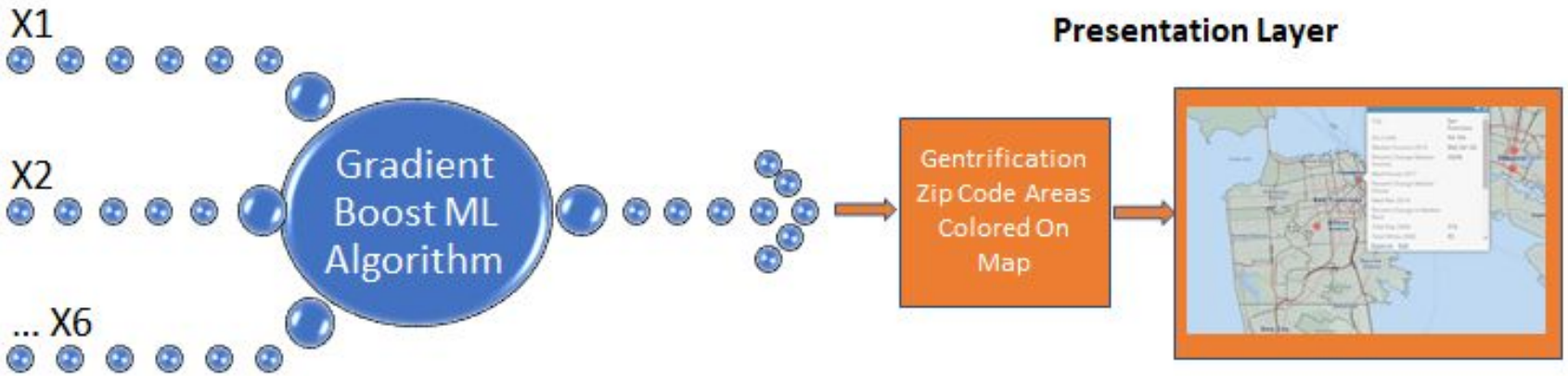
Feed Percent Change Into Machine Learning (ML) Model



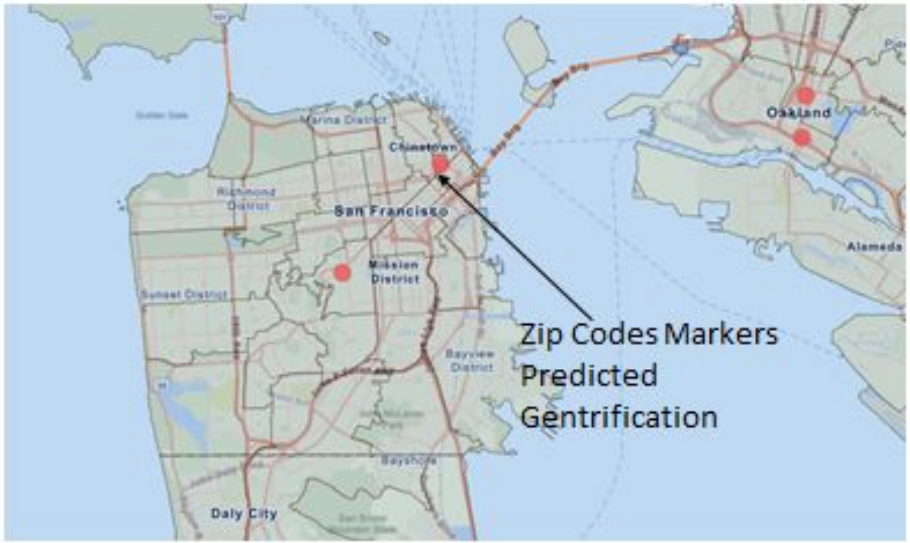
ML identifies Gentrification via patterns in Data

- Can Machine Learning provide early notice of Gentrification?
- Would early warning enable Policy Makers to minimize Displacement while still enabling neighborhood revitalization?

Gentrification By Zip Code Sent To Map



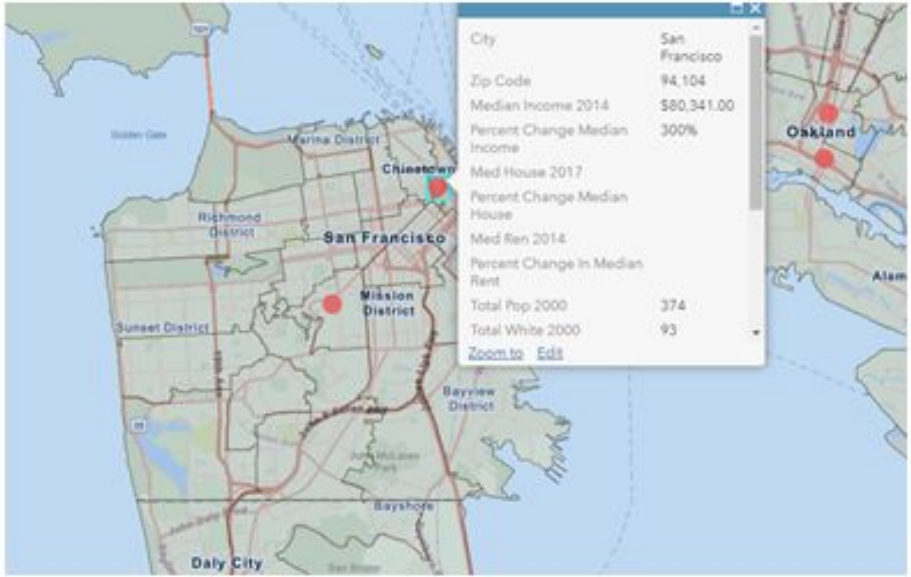
Prototype Visualization Layer



- Color Legend
  - Red Circle Markers – Neighborhoods Predicted for Gentrifying Y=1
  - All Other Neighborhoods Y=0

- Technology/Tools To Be Used For Dashboard
  - Prototype built using ArcGIS
  - Data was imported manually via CSV file marking Gentrified Zip Codes
  - Final Version will be fed from ML Output file directly into ArcGIS API using Python.
  - Alternative Tools are Tableau.

Prototype Visualization Layer



- Interactive User Element
  - Popup boxes for Gentrified Neighborhoods showing X1-X6 Features