

Verifying Volunteer Entries to NYC Street Tree Census

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A look at the data



NYC OpenData NYC Parks

TREES
COUNT 2015

652,173 trees

- 444,390 professional entries
- 207,776 volunteer entries

Health of trees:

- **Good** (82%)
- **Fair** (14%)
- **Poor** (4%)

Variables:

- tree diameter
- species
- signs of stewardship
- quality of tree guards,
- root/trunk/branch problems
- location

Project Outline

1

**Data
Cleaning**

2

EDA

3

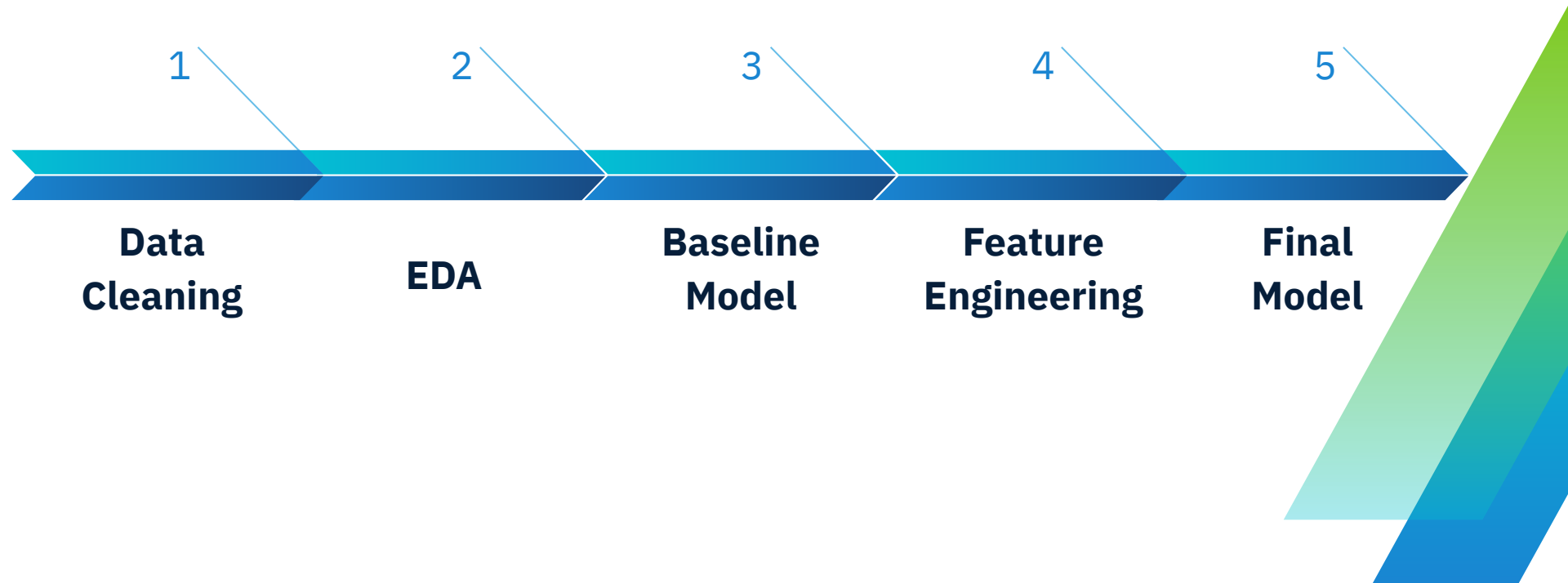
**Baseline
Model**

4

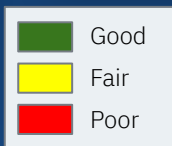
**Feature
Engineering**

5

**Final
Model**



Volunteer entries



Professional entries



Goals

- Recommend changes for next tree census
- Recommend policies for tree planting and maintenance
- Develop a model to verify the health status given by volunteers



Model preview

Vanilla random forest

Hyperparams: *class_weight='balanced'*

Accuracy: **54.7%**

Weighted F1: **61.5%**

Untuned random forest

Hyperparams: *class_weight='balanced'*

Accuracy: **82.1%**

Weighted F1: **77.8%**

Tuned random forest

Accuracy: **72.1%**

Weighted F1: **74.5%**

Hyperparams:

max_features=11,

max_depth=55,

min_samples_leaf=2,

n_estimators=500,

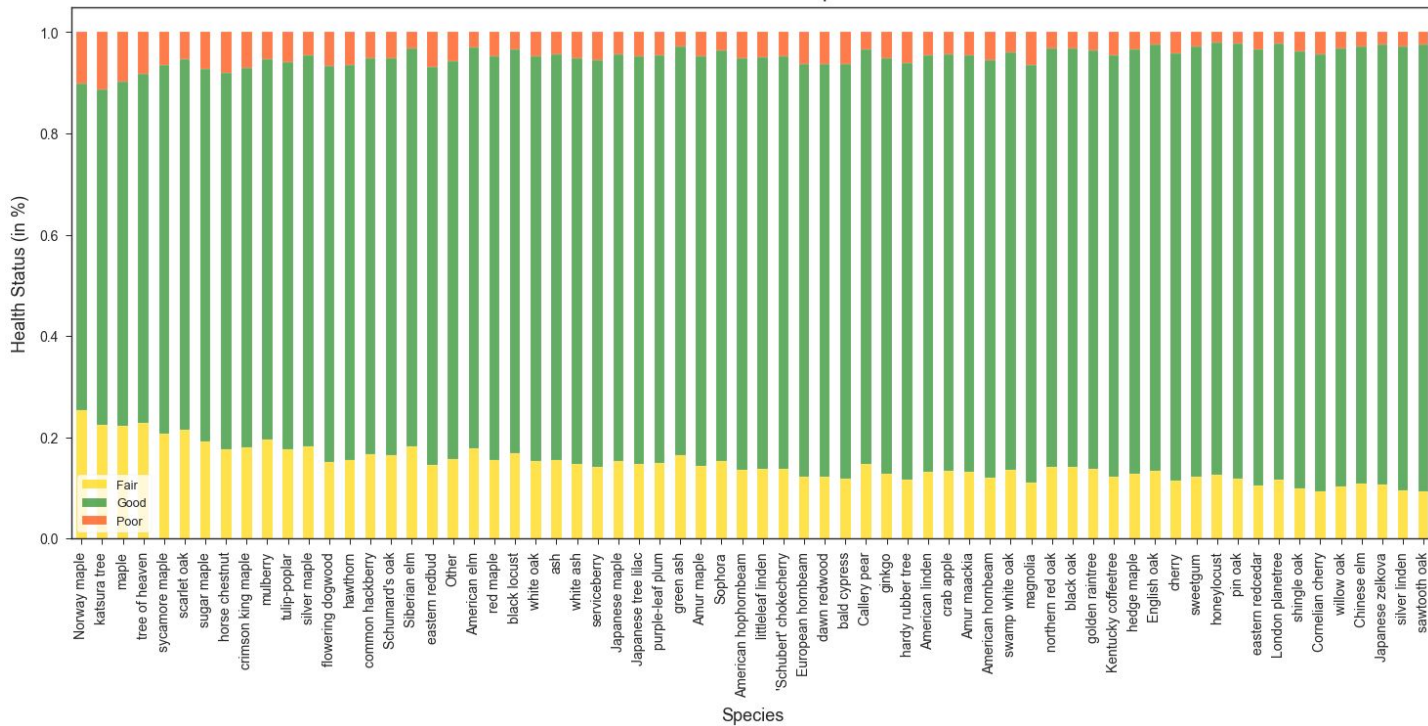
class_weight='balanced'

Species matters

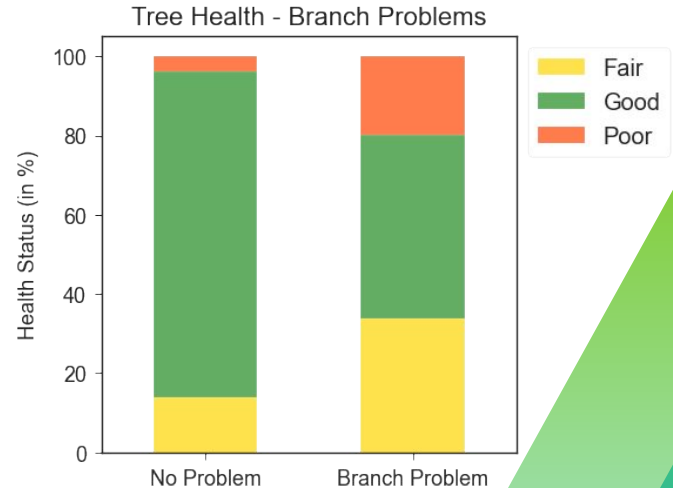
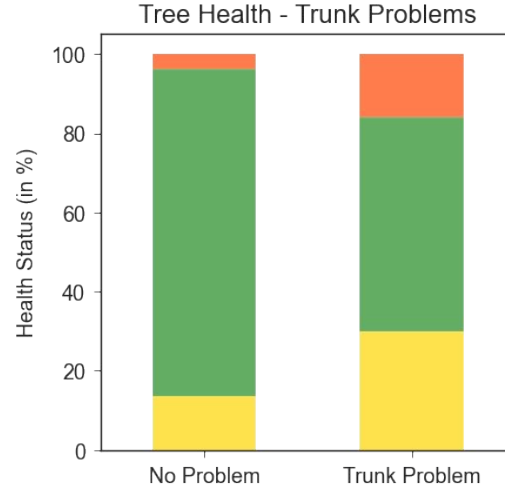
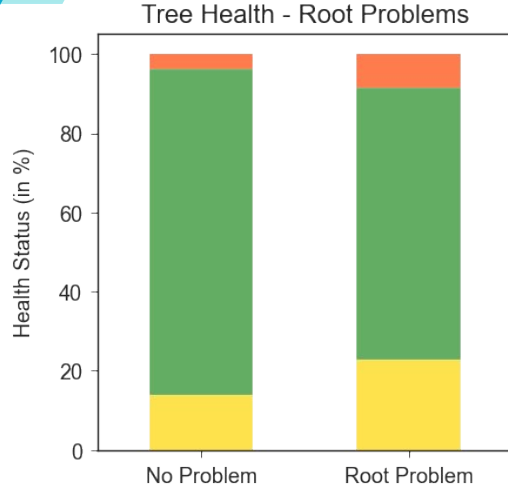
Top 3:
Norway maple
Katsura tree
Maple

Bottom 3:
Sawtooth oak
Silver linden
Japanese zelkova

Tree Health Across Species



Tree problems (and solutions)



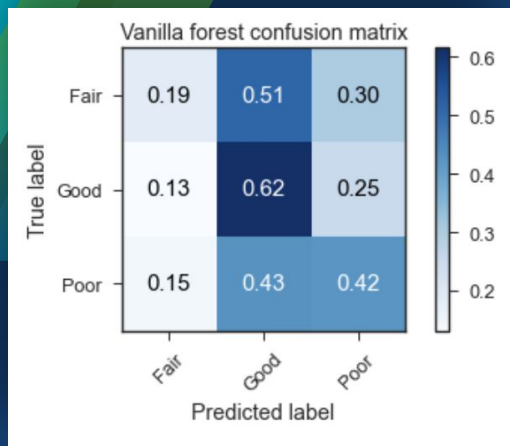
In future censuses:

- More specific problems or a notes column.

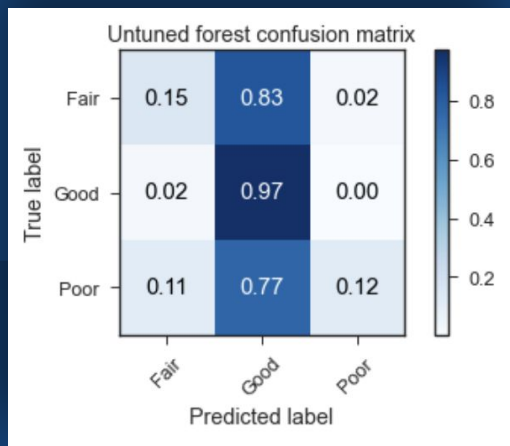
Other solutions:

- Regular maintenance
- Environmental protections, à la the plastic bag ban.

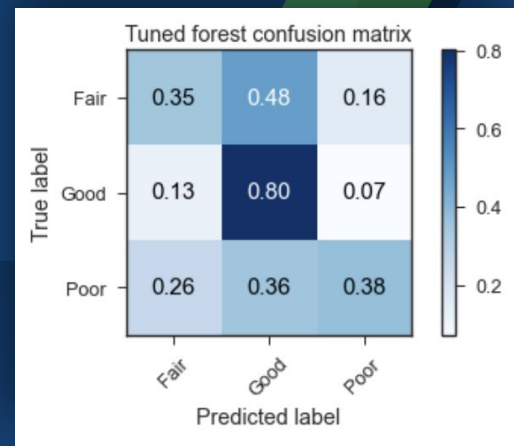
Confusion journey



Accuracy: **54.7%**
Weighted F1: **61.5%**



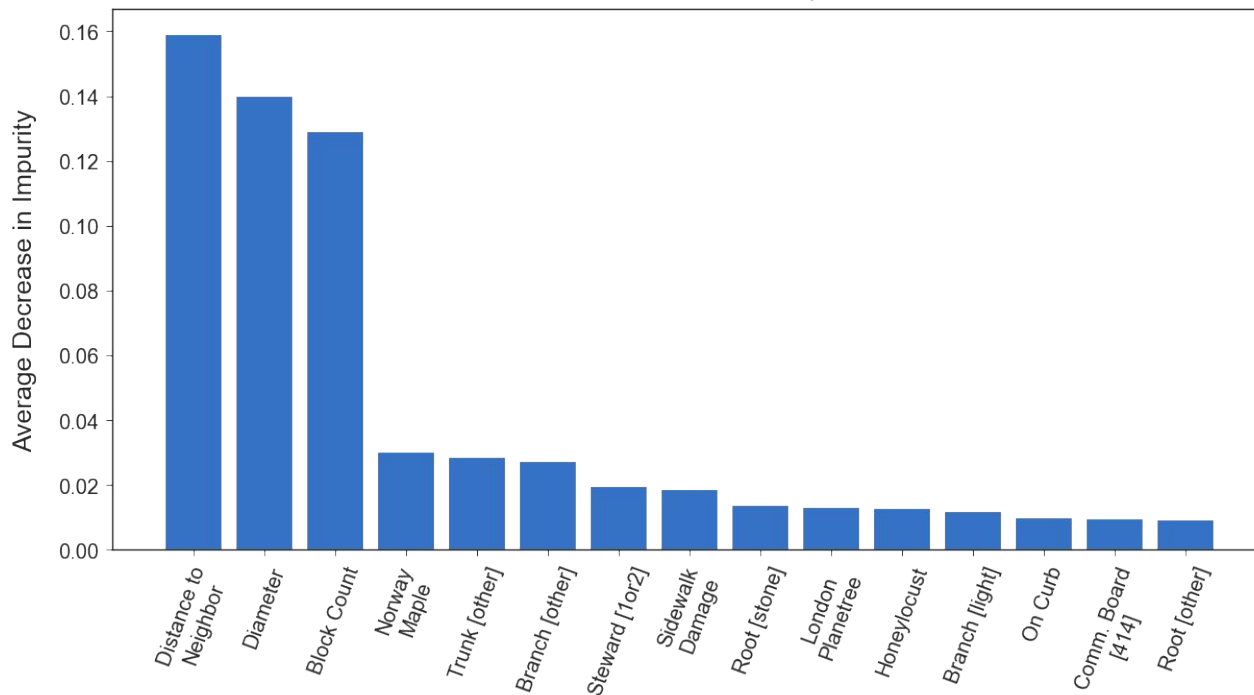
Accuracy: **82.1%**
Weighted F1: **77.8%**



Accuracy: **72.1%**
Weighted F1: **74.5%**

Final model - Random Forest

Random Forest Feature Importances



Accuracy: **72.1%**

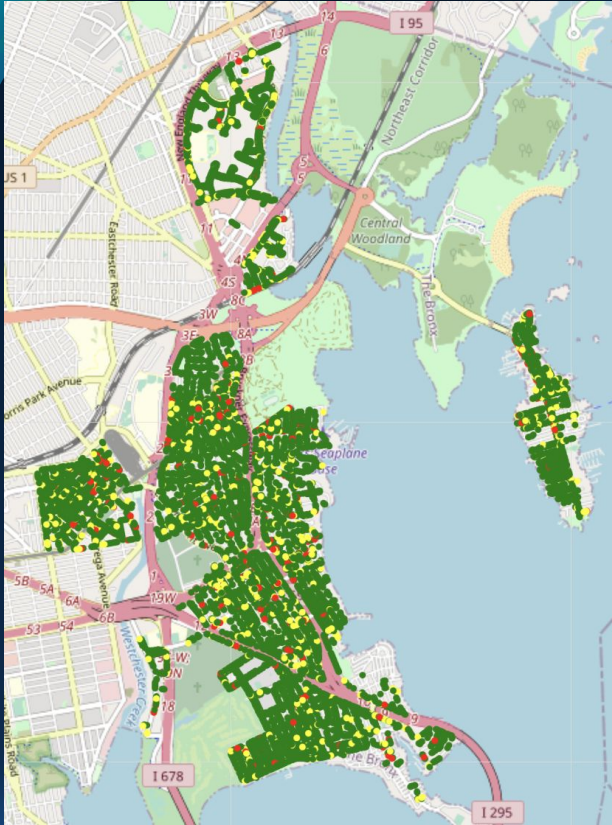
Weighted F1: **74.5%**

Weighted Precision: **72.1%**

Weighted Recall: **77.6%**

Community Board 210

Neighborhoods: Co-op City, City Island, Throggs Neck, Country Club, Zerega, Westchester Square, Pelham Bay, Waterbury Lasalle



Community Board 414

Neighborhoods: Breezy Point, Belle Harbor, Broad Channel, Neponsit, Arverne, Bayswater, Edgemere, Rockaway Park, Rockaway and Far Rockaway

Any questions?