



Machine Learning- Assisted Swimming Pool Detector

Capstone project proposal

The Data Incubator Fellowship





Hello!

I am Mo Motevaselian

I am here because I love data science.
Presenting my capstone project proposal for TDI.

Detecting Swimming Pools Using Aerial Images



Tax Assessors

- Increase of 6% to 11% in property value.
- Infrequent survey data.



Real Estate and Insurance

- Increase in the property value
- Updating the records via field visits



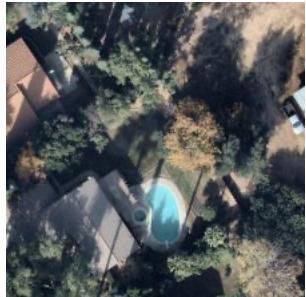
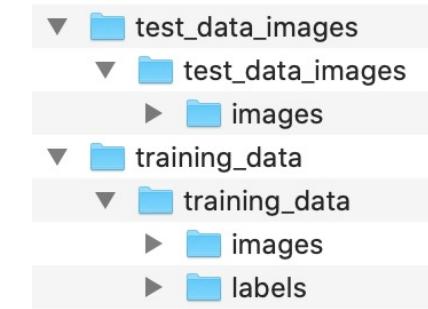
Bank and Municipalities

- Validating and licensing swimming pools
- Mortgage price for houses

Collecting Data

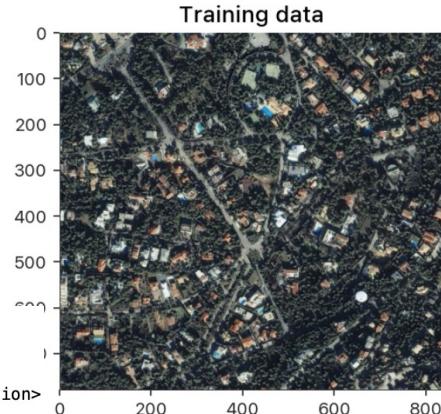
Creating Dataset using Google Earth

Kaggle Dataset (~ 120 MB)

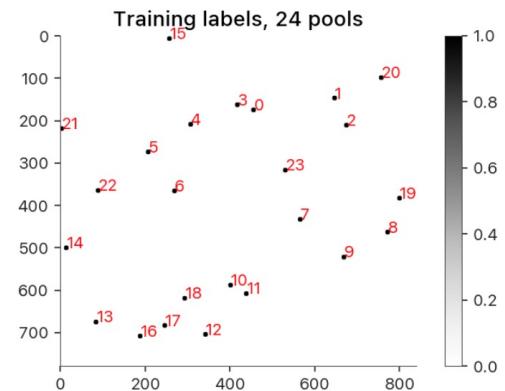


```
<?xml version="1.0"?>
<annotation>
  <filename>00000029.jpg</filename>
  <source>
    <annotation>ArcGIS Pro 2.1</annotation>
  </source>
  <size>
    <width>224</width>
    <height>224</height>
    <depth>3</depth>
  </size>
  <object>
    <name>2</name>
    <bndbox>
      <xmin>96.43</xmin>
      <ymin>136.30</ymin>
      <xmax>140.88</xmax>
      <ymax>180.74</ymax>
    </bndbox>
  </object>
</annotation>
```

(~ 3 MB for pre-analysis)

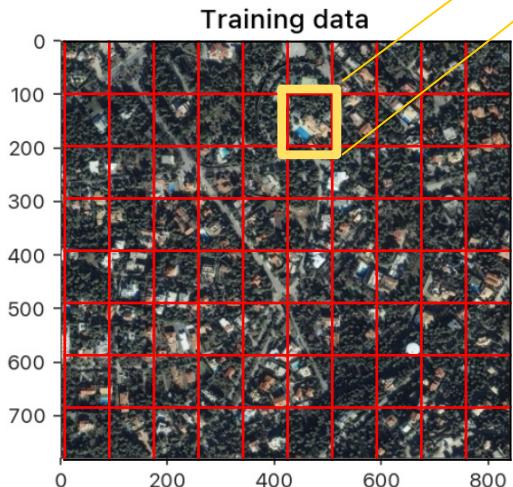


```
cr = array([
  [455, 176], [646, 148], [674, 212], [417, 164], [307, 210],
  [207, 275], [269, 367], [565, 434], [771, 464], [668, 523],
  [401, 589], [438, 609], [342, 705], [84, 676], [14, 501],
  [257, 8], [188, 709], [246, 684], [293, 620], [799, 384],
  [756, 100], [3, 220], [89, 366], [530, 318],
])
```



Data Processing and Inputs

Making Patch Indices

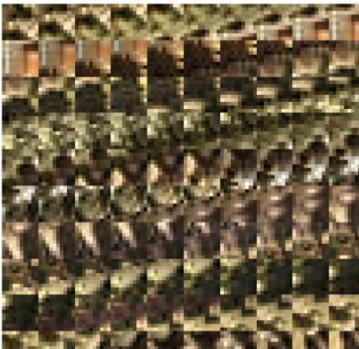


10x10 patches

Some pool patches

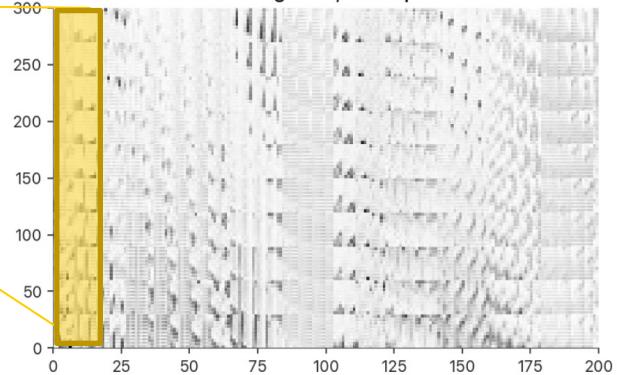


Some non-pool patches

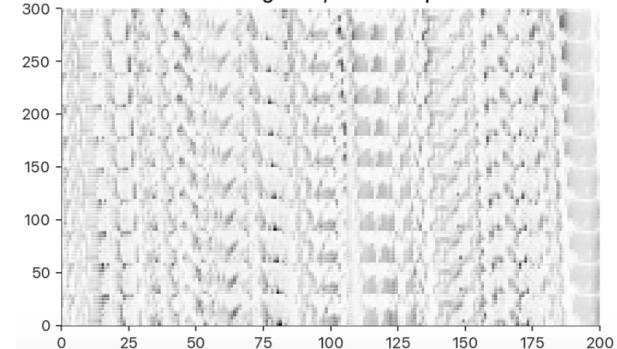


Vectorize each patch (300 dimensions!)

Training data, class pool



Training data, class no-pool



Next Steps

01 Dimension Reduction

- 300 dimensions is a little too much !
- Reduce the dimension using principal component analyses (PCA)

02 Simple Classifier

- Gaussian classifier
- Supported vector machine (slow on large data)

03 Deep Learning

- Convolutional Neural Networks (CNN)
- Transfer Learning (ResNet, ...)



Thanks!

Any *questions* ?

You can find me at

- ◉ momotelian (github)