StreetView API

Introduction:

- Determining location via images
- Uses
    - Classifying large datasets of unlabeled images
    - Giving location estimates in cases where gps is not available/too expensive
    - Autonomous driving
    - Generating 3D environments
    - Models like this can expand upon just geolocation
        - Ex: determine natural disaster readiness of locations
- Research by others
    - PlaNet
    - Google Landmark Recognition
    - https://arxiv.org/ftp/arxiv/papers/1701/1701.05105.pdf
    - https://arxiv.org/abs/1810.03077
    - https://github.com/Nirvan66/GeoguessrAI/blob/master/documentation/GeoGuessrAI.pdf

Data

- Used Google Street View images
- Specified focus on Colorado
    - Large, geo-diverse location
- Split regions into Colorado's 64 counties

Methodology

- Use Convolutional Neural Nets and train the model on Street View images
- First step:
    - Train on ResNet: one of the leading image classification models with over 150+ layers
    - Train with imagenet dataset
    - Map to dense softmax layer with 64 outputs, one for each county
- Next Step:
    - Create CNN from scratch
        - Using various combinations of Conv2D -> MaxPool, repeat
        - Filter through Dense layers to get output
- Assumptions:
    - All images are gathered near large roads
    - Image quality differences distinct to certain areas could bias the model
- Measuring:
    - Using validation accuracy to determine "fit" of the model
    - Using 90% of data as training data and 10% as testing
        - Subject to change depending on best result

Results

- Determining accuracy over baseline
    - https://github.com/gapkim/Landmark_Recognition/blob/master/project_proposal.pdf
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Future Work

- Could expand model to cover the entire United States
    - Test over all states within the US or all counties within the US
- Could expand model to cover the entire world
- Could focus on large cities around the world
    - Cities may be easier to classify
    - More distinct architecture, cars, vegetation (or lack thereof)
- Can use data beyond Streetview
    - Geotagged images on Flickr or other websites