Math 156: Classifying Geographical Land Use and Land Coverage

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January 31, 2025

1 Objective

The main objective of this project is to build on land use and land coverage detection models to the US land. We will use models to accurately classify different sections of land (such as river, buildings, farm land) to discover data about the land all over America.

1.1 Application

We will be applying a convolutional neural network (CNN) to land use classification on satellite imagery. This can be further used for development, detailing ownership, and resource identification (such as a body of water or vegetation).

1.2 Dataset

The proposed dataset is the EuroSat dataset which consists of images taken from the Sentinel-2A satellite under the European Space Agency Copernicus program [1]. It contains 27,000 64x64 patches classified into 10 land use classes.
We also plan on downloading satellite imagery from Earthexplorer.usgs.gov of Los Angeles for out of distribution testing and comparing our results with actual reported land use percentages.

2 Model

We plan on applying a vanilla CNN model with varying layers and hyperparameters as well as testing different models like GoogLeNet and MobileNet [2] [3].

3 Project Steps

1. Train CNN models on EuroSat dataset with varying hyperparameters.
2. Test models on unseen data from EuroSat dataset.
3. Download satellite images from Earthexplorer.usgs.gov of Los Angeles for out of distribution testing and compare with reported values.

4 Project Distribution

Our distribution of work will be split evenly, with both of us working on the code together and then training different variations of the models. We will also split the writing of the project equally, with Brian writing the Objective, and Model section and Victor writing the Project Steps and Project Distribution sections.

References

[1] Patrick Helber, Benjamin Bischke, Andreas Dengel, and Damian Borth. Eurosat: A novel dataset and deep learning benchmark for land use and land cover classification. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 12(7):2217–2226, 2019.

[2] Andrew G. Howard, Menglong Zhu, Bo Chen, Dmitry Kalenichenko, Weijun Wang, Tobias Weyand, Marco Andreetto, and Hartwig Adam. Mobilenets: Efficient convolutional neural networks for mobile vision applications. *CoRR*, abs/1704.04861, 2017.

[3] Christian Szegedy, Wei Liu, Yangqing Jia, Pierre Sermanet, Scott E. Reed, Dragomir Anguelov, Dumitru Erhan, Vincent Vanhoucke, and Andrew Rabinovich. Going deeper with convolutions. *CoRR*, abs/1409.4842, 2014.