

CS486 Project Proposal (Fall 2017)

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Application Domain:

Image Classification by AI / ML algorithms: To recognize buildings of Math Faculty(DC, MC & M3) from pictures of buildings in UWaterloo campus.

Problems to tackle:

1. Data Collection: Since the amount of training data(Math buildings) from Google-Image are limited, we will also write scripts to scrape images from the 360-degree street-view of each math building in Google Map.
2. Hardware Constraints: Training efficiency might require great GPU performance.
3. There might be other factors in images that could influence the training result: season, weather, altitude degree; some of the buildings may even look similar from human eyes.
4. Future Improvement: Our ultimate goal is to recognize whether the building in the given image is of which faculty in campus.

Techniques plan to develop/analyze

We are planning to try and evaluate many existing machine learning methods to reach our goal. Currently the following image classification algorithms interest us: Convolutional Neural Network, K-Nearest Neighbor, Support Vector Machine, Decision Tree, and naive bayes. We utilize classifiers provided by open source libraries such as Scikit-Learn and Tensorflow, based on each algorithms. We might also develop own classifiers. Then we will train the model with datasets and evaluate the result.

We might also apply some feature engineering techniques such as binarizing and blurring onto the dataset if needed.

Reference:

1. Face recognition:
http://cvrr.ucsd.edu/ece172a/fa10/projects/papers/eigenfaces_cvpr.pdf
2. Three-dimension recognition object from single two-dimension images:
<http://www.sciencedirect.com/science/article/pii/S0004370287900701>
3. Human pose recognition:
<http://sistemas-humano-computacionais.wdfiles.com/local--files/capitulo:modelagem-e-simulacao-de-humanos/BodyPartRecognition%20MSR%2011.pdf>
4. Local scale-invariant features:
<http://www.cs.ubc.ca/~lowe/papers/iccv99.pdf>
5. SSD: W. Liu, D. Anguelov, D. Erhan, C. Szegedy, S. Reed, C.-Y. Fu, and A. C. Berg. Ssd: Single shot multibox detector. In European Conference on Computer Vision, pages 21–37. Springer, 2016
6. YOLO: J. Redmon and A. Farhadi. Yolo9000: Better, faster, stronger. arXiv preprint arXiv:1612.08242, 2016.
7. Fast R-CNN: R. Girshick. Fast r-cnn. In Proceedings of the IEEE International Conference on Computer Vision, pages 1440–1448, 2015