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DATS 6203 - 11

Machine Learning II

*Final Project Proposal - Group 3*

*Facial Recognition*

*Problem*

We have decided to try facial expression recognition applications of image classification for our final project.

*Database/Dataset*

We plan to initially design and train our network with the [YaleFace](http://vision.ucsd.edu/content/yale-face-database) dataset. We chose this dataset because it was the only one we could find that was easily accessible and encoded with facial expression classifications. Though this dataset is small (165 images), we anticipate that it will be a useful and manageable dataset to develop our network. Once we can get the network built and properly trained, we plan on expanding it to the National Institute of Standards & Technology’s (NIST) [Color FERET](https://www.nist.gov/itl/iad/image-group/color-feret-database) database, a color image facial recognition database used to evaluate and research biometric systems. We also plan on researching other facial data to ensure we train the network with as much image data possible. As a backup, we also have images from the [AffectNet](http://mohammadmahoor.com/affectnet/) database, which contains a collection of more than 1M images annotated for the presence of discrete facial expressions.

*Deep Network*

We plan on using a convolutional neural network. At this time, we are still evaluating whether we can use the standard form of the network, or adapt it for the purpose of facial expression classification. We are reviewing scholarly research and examples of using convolutional neural networks for facial expression recognition.

*Framework*

We plan on using PyTorch. We chose this network because of its relative ease of use, thorough documentation and availability of resources and examples. Plus, we were very impressed with its performance on the fashion MNIST dataset.

*Reference Materials*

We will be researching the links provided in the final project guidance, specifically the ones curated by Stanford and Columbia. Though we are still in the early stages, we are looking to examples such as “[*Convolutional Neural Networks for Facial Expression Recognition*](https://arxiv.org/abs/1704.06756?context=cs)*.*”

*Performance Metrics*

We plan on evaluating our network’s performance based on run time, learning rate, learning time, and overall and per-class classification accuracy. Given our access to additional facial expression databases, we also plan to assess the ability of the network we build to generalize broadly when built on a more limited set such as the YaleFace dataset or larger sets such as the Color FERET or AffectNet databases or vice versa.

*Tentative Project Schedule*

* 6 April - Submit Proposal
* 12 April - Successfully design and train network to classify YaleFace Dataset
* 14 April - Successfully adapt and train Network to classify ColorFERET Database
* 21 April - Complete code review, testing, project documentation and presentation
* 23 April - Commit final project package to Github and submit link