Daniel Park

QEA Project 1: Faces Project

Summary

Open with a one paragraph summary that orients LinAlgCo to what they will find in the report. It should make clear why the report was written, what each section will accomplish, and what the key insights and results are. You should also summarize your recommendations.

This report will detail my process of implementing a face recognition system that will automatically load an image, or manually select an image, and then will find an image of the same person from the image dataset. The introduction will take about the implications of the project and potential bias of the algorithm, the methods will go into detail about how the system was made, the detailed findings will discuss my completed system and the corresponding graphs for verification and validation information, the recommendation section goes over key findings of my model and areas for future investigation, and finally the references section with all the sources reference in this report paper.

Introduction

Your introduction should: (1) Provide the background and context for the algorithm and context that you have chosen to analyze. When and where is it used? By whom? What are the general technological or socialissues associated with its use? (2) Explain your algorithm technically. How does it work? Bear in mind your audience. (3) Lay out the general ethical implications of the algorithm that you are investigating. Underwhat circumstances could the technology be helpful or harmful? Whom might it help or harm, and how? (4) Clearly state, within the broader ethical context, what question or issue you are exploring and and whatsub-question you are quantitatively investigating.

Facial Recognition Systems is a relatively modern technology that is capable of matching a human face from a digital image or video frame against a database of faces. This technology is mostly utilized to authenticate users through identification services while also being deployed in advanced human-computer interaction, video survelliance, and more recently, smartphone and robotics identification software. Over the past couple of decades, people have discovered numerous ways of deploying a facial recognition software such using different types of machine learning techniques or using a convolutional neural network (CNN for short) to recognize faces, but the way this report will explore a simpler approach founded by Matthew A. Turk and Alex P. Pentland in 1991 is called the "eigenvector-based recongnition system" and have the software automatically or manually load a specific image within the dataset and find an image of the same person from the same data-set.

Although deploying a facial match recognition system seems simple enough, there are possible ethical issues that come up. Since this algorithm would be servicing a large and diverse population, not just a specific demographic, reducing bias in training data will be necessary to prevent accuracy issues once deployed. Detection may falter when it comes to those with similar face structures because those face structures can misidentify a person as a different individual. Recognition can also falter for darker-skin toned people because their facial features may not be as coherent as those with light skin tones and may be difficult to detect those with darker skin tone because of the possibility where their facial features are not that clear.

So in light of these possible controversies, this report will answer the question "Can we make an algorithm that takes in a dataset of people and using eigenfaces, detect a image from within the dataset that matches the

face?" with its corresponding sub-question, "Can we eliminate as much bias as possible by incorporating a certain amount of test and train images for our model?"

Methods

Having introduced the reader to terminology and ideas, this section should lay out the approaches you are using, both in terms of the chosen algorithm and the analysis you are doing with it. Use equations anddene all variables. (Go into detail later)

1. Find a Dataset of different people but each person has at least five images
2. Prepare Dataset
3. Load Dataset
4. Reshape the images into a single column matrix
5. Calculate mean of all images and subtract mean from them
6. Subtract the mean value from the image from which we want to recognize then multiply with eigenvector
7. After finding difference between current image signatures with signature from the images, we can predict the images involved.

Detailed Findings

This section should contain your main results and consequences of your work which you have quantied.This section should contain some clear, informative, labeled, and captioned plots and images that demonstrate your findings. Quantitative results should be clearly connected to the context of the investigation. Why areyour ndings meaningful? Reect on the downsides of the technology and the people it could hurt, and suggest some strategies for improvement

Recommendations

Summarize the key ndings of the report, situate them in the greater context,and identify areas for future investigation. This section should be concise—they details go in the previoussection

References

Provide full citations for sources referenced in the paper. Format doesn't matter here as long as you providesucient information about each of your sources.

- Face Recognition Using Eigenfaces 1991 Report: http://www.mit.edu/~9.54/fall14/Classes/class10/Turk%20Pentland%20Eigenfaces.pdf