Homework 8

Monday, November 2, 2020 11:22 PM

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Chapter 23

Homework 8: Eigenfaces Paper, Project, and Cheat Sheet

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23.1 Eigenfaces Paper

Check out *Eigenfaces for Recognition*, an early paper on Eigenfaces, by M. Turk and A. Pentland. You have most of the tools to understand this paper, but the writing style might be unfamiliar (intense!). We recommend that you take quite a bit of time reading through this paper (maybe about 3 hours). For some of you this may be the first time you are reading a technical research paper like this. The first 6 pages of this paper describe the use of Eigenfaces in face recognition. Check out other sources as well. Wikipedia is pretty useful for Eigenfaces, and this later paper talks about Eigenfaces and an extension called Fisherfaces (not fish faces).

Some readings on reading (these are for your reading... no seriously, read these first).

- Some pretty nice advice on how to read a paper that Michael Mitzenmacher users in one of his Harvard CS classes.
- Another nice guide to reading research papers. This one is by Jennifer Raff, a Professor of Anthropology at the University of Kansas.
- A tongue-in-cheek guide to reading a scientific paper (read this is you are feeling that you are the only one who is not capable of reading through the Eigenfaces paper and understanding it all at one go).

Exercise 23.1

We are asking you read this paper for several reasons. We hope that it highlights and synthesizes all the material you've learned in this module. It will also give you practice reading a technical paper, which is a skill you'll continue to develop over your career.

1. Summarize the paper using a method of your choosing (the readings above have some suggestions on what should be included in this).
2. In what ways was your approach to implementing the Eigenfaces algorithm similar or different

from the authors' approach?

3. In what ways did your understanding of the Eigenfaces algorithm change after reading the paper?
4. Were there places in the reading that you "got stuck?" If so, how did you address that?
5. What questions do you have after reading the paper?

23.2 Beginning the Project

In this project you will extend the work you have already done on using linear algebra to analyze data (e.g., for face recognition) and analyze the performance of an existing algorithm within a real context. We know that facial recognition and other applications of linear algebra to data can be incredibly powerful, but they are often prone to failure, and those failures can have very real consequences on people's lives. In this project we are challenging you to think about linear-algebra based systems in a real-world context. To prepare for Tuesday's in-class ideation activities, we ask you to do two things:

1. Read the project description, which can be found in the next chapter (Chapter 24), and write down any questions you find yourself asking. Please ask us these questions (e.g., by posting in the General channel on Teams or by e-mailing the teaching team list)!
2. Fill out this partner survey by 11:59pm on Sunday, November 1st (we will review the forms first thing Monday morning). We will let you know who your partner is before you arrive for class on Tuesday, November 3rd.

23.3 Cheat Sheet

There is a tradition in schools and colleges that students take exams. A "cheat sheet" can be a valuable tool for studying. We would like you to prepare a cheat sheet for the material we have "covered" so far this semester. If you don't know what a cheat sheet is then please consult Wikipedia. Cheatsheet.com is also fascinating.