**MATH 4W03 Journal**

**Aaron Shannon 400303492**

**January 11, 2024:**

* Met with Dr. Kevlahan to discuss how the Reading course would be set up.
* Received past report from Lilly to act as a starting place for research.
* Discussed looking into extensions of her research, and references of her paper.
* Read Lilly’s paper, was a review of Singular Value Decomposition (SVD), with applications of facial recognition, image compression and latent semantic analysis (LSA).

**January 12, 2024:**

* Looked into references of Lilly’s paper,
* [IEEE Xplore Full-Text PDF:](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6178280) After reading, the math is too complicated to do for this time.
* [Singular Value Decomposition and Neural Networks | SpringerLink](https://link.springer.com/chapter/10.1007/978-3-030-30484-3_13) Talked about the link between SVD and neural networks, however there is not enough math in the paper to write my own paper on.

**January 15, 2024:**

* [neural\_nets 2.pptx (cmu.edu)](https://www.cs.cmu.edu/~aarti/Class/10701_Spring14/slides/NeuralNetworks.pdf) Did not contain full math steps to write programs with, not a good source to write my paper.
* [nonlinear-predictors.pdf (stanford-cs221.github.io)](https://stanford-cs221.github.io/spring2021-extra/modules/machine-learning/nonlinear-predictors.pdf) Did not contain full math steps to write programs with, not a good source to write my paper.
* [IEEE Xplore Full-Text PDF:](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1165576) Contained basic algorithm steps for Neural networks

**January 18, 2024:**

* Met with Dr. Kevlahan to review findings of the week.
* Agreed that the Noise cancelling algorithm was to difficult to continue.
* Dr. Kevlahan gave a few topics to research for this week; Compressive sampling, sensor placement.
* Started up a github account to store matlab and journal files.

**January 19, 2024:**

* Find a study that links the topics of compressive sampling , svd and machine learning together through the link of big data. Smart Sampling and Optimal Dimensionality Reduction of Big Data Using Compressed Sensing. [Smart Sampling and Optimal Dimensionality Reduction of Big Data Using Compressed Sensing | SpringerLink](https://link.springer.com/chapter/10.1007/978-3-319-30265-2_12#Bib1)
* Read up on Compressive sampling. [An Introduction To Compressive Sampling | IEEE Journals & Magazine | IEEE Xplore](https://ieeexplore.ieee.org/document/4472240) , [978-3-031-09745-4\_1.pdf (springer.com)](https://link.springer.com/content/pdf/10.1007/978-3-031-09745-4_1.pdf?pdf=inline%20link)
* Downloaded the l1 magic matlab toolbox and code that gives examples for compressive sampling of reconstructing images.
* Algorithm called hierarchical compressed sampling mixes compressed sampling with svd steps.

**January 22, 2024:**

* Read up on the k-svd algorithm that was mentioned in the Big Data paper. [doi:10.1016/j.jvcir.2008.03.001 (sciencedirectassets.com)](https://pdf.sciencedirectassets.com/272324/1-s2.0-S1047320308X00033/1-s2.0-S1047320308000254/main.pdf?X-Amz-Security-Token=IQoJb3JpZ2luX2VjEID%2F%2F%2F%2F%2F%2F%2F%2F%2F%2FwEaCXVzLWVhc3QtMSJIMEYCIQCCMCptx07mlSI0%2BsMEu9%2FkfepiH2EFU75T%2BhRAcoX0WQIhALZjhqxoRft2AzoK6a329sI6HNCjw6TjCG2uoR7d5mUeKrMFCDkQBRoMMDU5MDAzNTQ2ODY1IgyDsq%2BusVplCoxzMEAqkAXmJwgZ1s8x265mQjrnshutJId3MwW9QWH8AGA5AjJ50lSVwKCKu2mnkmGFR9Rw2YhMZANxVt7sGhnyCn12QPsBzl1kAEwB3xoJP2dJPmuLo%2BUQvHQLb5n3lx7WPXxl8eyOQi5sa%2BJAmdDqErpnpSALsyrYcSLw%2FQpsK4eZZfnPGBRlm4nUDRDRQICsPDPoiSet9y9IBuCV%2BLJ7BTssluaK7eUSIVWb5EBx%2FT15C1w%2F6PgBvztc6O4T3JDwDwHjbrJ%2FvAyO2fsf%2B45Wyqb1i59%2BqxMeEU7Trjvy3VUD4NAW4Zg%2BzQ90zpHtwzybY9ZUeB%2BLrgq3ZkzXvQCuGk6pfBUKUisjHyfclbpXzaq5ewpc8Rs8LdxncQHnG7rj9oZNc1DhJbh1FlRdU2oGGWHQOsRCYsD2aLl%2FT1rUkq8IQmGoXUdRYspGoAvUJyV7J5edZg6LORcT%2Bt86q6cQX85JqeYJgHjCcovOIjhYpdIxebPtnxnCAsZYwuJyVx6QyDSoaZtHj2au5mZmkQm0IEsIcFi8r5yEGYHCtet2mK39Hu6N5nEf%2B%2Bg7p%2FAe0Qm4FP5u7GjhdXMrE7vdnMjL%2BMnNY8tSGzFtngpk%2BneEy3RJKakLLb26WmWUVKWSjAqnqojWk8xtWZFNRnKtBZukPtSuxVdObB4YwiRGPHGsldheKdfLnrQWF7Yk3wxHpo6GUgPLgfmJSuyj7nIiRhYTZ4rC%2FnvhfEBfMGtDyfUB%2Bj3hfMdMs69RwiyfUJtG15OAji2XytMf1RgZBT2%2BhMRSqZO03xgZY1KS2iZFvqtyj9r8uFq%2F7RCqZR%2B4xl71idcJno29%2FaI3mKC8nejFa2W8EJRRuzHFj6CxZUZeRGc7OtBJ%2FC0kyzC63batBjqwAfctF7%2FtMCQk2veLl4exvxTwLhSqwLcyrC9Qc%2Blx4vysPmYCmFRHHV3PP3b%2BY4g4uX%2FBKKNyMQQjAmxYkntGwUg3U4ZQ9YgezD7KDVqSIZjIjDRNY6QAKhtFMyduZVgsAEzvqHiGTuelE4Nxy8mmXImgLSennDPfVL9wIDYuOwtqBvBo8sfEJP5myfOXcxi6alerMzyQVPuithEDaAsDOz2aBNeL089u01xeYcbGfqK4&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Date=20240122T004856Z&X-Amz-SignedHeaders=host&X-Amz-Expires=300&X-Amz-Credential=ASIAQ3PHCVTYSXJSKPUI%2F20240122%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Signature=8093a5cc32cca17fc15b582348eb680b5b191c9a029381953e30b9f9449bde5d&hash=311568f1493a2170d7b4cdb80cdf46344802f7002d5e6a715ec3f8d5f5502841&host=68042c943591013ac2b2430a89b270f6af2c76d8dfd086a07176afe7c76c2c61&pii=S1047320308000254&tid=spdf-dd6b76d1-bc5f-4af8-8f93-a1632c1c24b8&sid=766ceda03dd97345fb6b66394debc74e450bgxrqa&type=client&tsoh=d3d3LnNjaWVuY2VkaXJlY)
* K-svd algorithm has links to image denoising. [Image Denoising | SpringerLink](https://link.springer.com/chapter/10.1007/978-1-4419-7011-4_14)

**January 25, 2024:**

* Meet with Dr. Kevlahan to discuss progress. For this week, start to format the research paper and write the abstract and introduction.

**January 30th, 2024:**

* Formatted the paper using the springer nature template for LATEX, wrote the beginning of the abstract and intro, will need further editing when other sections have been written.

**February 1st, 2024:**

* Met with Dr. Kevlahan to discuss progress. Formatting needed a few changes, however, structure is okay. Work for this week is to start to write the beginnings of the mathematical sections.

**February 6th, 2024:**

* Started to write the SVD and CS sections, starting with their equations and the background information of the algorithms.

**February 8th, 2024:**

* Meet with Dr. Kevlahan to discuss progress. Formatting of Mathematical Writing needs work, to have complete sentence structure, ie formulas are not disconnected.
* Read the CS paper Dr. Kevlahan sent to me to gain more information in the topic.

**February 15th, 2024:**

* Skip Meeting with Dr. Kevlahan to continue to work on the two sections of SVD and CS.

**February 16th-25th, 2024:**

* Work on the SVD and CS sections.

**February 26th, 2024:**

* Finish the SVD and CS sections, share the link to the LATEX document as well as the GITHUB repository where code will be stored.

**February 29th, 2024:**

* Meet with Dr. Kevlahan to discuss the finished SVD and CS sections.