EE/CprE/SE 491 WEEKLY REPORT 2

2/12/24 - 2/24/24

Group number: 13

Project title: Allergy Prediction AI

Client &/Advisor: Ashraf Gaffar

Team Members/Role:
Eric Christensen: Initial Component Design
Zoe Davis: Team Organizer
Josh Dutchik: Documentation and Frontend Support
Blake Friemel: Frontend Development and Testing
Jack Gray: Front and Backend Testing
Michael Koopmann: Client Interaction
Jihun Yoon: New Member

- **Weekly Summary**

A big part of what our group did this week was apply focus to the AI model. We first started off getting the AI Keras model framework up and running in our own project's GitHub. There were some small tweaks that needed to be made but overall, the transition was smooth. Next, we put more focus on the data and how we were going to encode the information so the model would be able to use the patient data and allergen data in a way that an AI model can easily process the information. We created two python scripts to help us with this. One that takes the data from the excel file and stores it locally on our computer. The second one formats the data in a way the AI model can use the data to make a proper connection. We then shifted our focus to the AI model itself and the code that it was running. Since we had the framework implemented, we had to make changes that allow us to run the model with the data we just formatted. We were able to get the inputs working and the data was run through the model and an output was given. We made small changes to the frontend and backend but overall, our AI model and the actual data is what we shifted our focus to.

- **Past week accomplishments**
  - Eric Christensen:
    - Made a personal git branch to experiment with current model. Looked through relevant keras.io to help me with my experimentation. Practiced using model with an example dataset to better understand how it works.
  - Zoe Davis:
    - Practiced training models to ensure the path we are going on is the best model and training path for our data
    - Started trial training on the model in our github on my personal machine (not

going to push to github until we meet next to ensure I'm doing it correctly and won't mess up the github repository

- Josh Dutchik:

Throughout the week I have been working on the connections between the frontend, backend, and AI model. Started by creating and implementing the framework for the AI model. Since we as a group decided on a model that Keras the workload consisted of making sure the model could the inputs of the data we were giving and returning an output that consists of what the patient is allergic to with the data that is provided. Created two python programs that read the excel data and format the data that will help encode the data for the inputs we will use. Worked on sending the AI model output to the frontend but still have some work to do to have a full connection cycle in where our frontend will talk to the AI model and then give the results back to the frontend.

- Blake Friemel: I ran the AI model out team selected on the Keras website to become familiar with what data is needed and how it is trained. I also started to design the frontend portion of the user interface. Which data parameters need to be passed to the AI model, and how that data will be transferred to our database.
- Jack Gray: Went through the relevant keras.io model tutorial that we picked to be similar to our project. Downloaded all the relevant tools environments and data and successfully got it to run and got a good result. Got familiar with all the definitions, variables, and results the model uses. Looked into the model we have on git hub and started to think of the comparison between the example model and our model and what adjustments we need to make.
- Michael Koopmann: Started working on further models using the full dataset now to make predictions on all allergens percentages instead of making predictions on just one allergen.
- Jihun Yoon: Individual studying of the Keras model and JavaScript. Contacted faculty members regarding permission of use of servers.

o **Pending issues** *(If applicable: Were there any unexpected complications? Please elaborate.)*
- Eric Christensen: none
- Zoe Davis: Nothing more than learning frustrations, no real issues
- Josh Dutchik: Model is difficult to train but something we will solve over time
- Blake Friemel: none
- Jack Gray: none
- Michael Koopmann: none
- Jihun Yoon: I need to meet with the TA to sign the NDA. Awaiting a response from the last faculty member about possible use of ISU-hosted servers for our backend.

- o **Individual contributions** *(Creating this section is optional, but it is **Required to include the "Hours Worked for the Week" and their "Total Cumulative Hours" for the project for each member somewhere relevant in your report. Your individual weekly hours should be at a minimum of 6-8 hours for this course. So please manage your time well. Also, ensure that individual contributions support your claim to the weekly hours. Be honest with the reports.)***

NAME	Individual Contributions *(Quick list of contributions. This should be short.)*	Hours this week	HOURS cumulative
Eric Christensen	Practiced model training	6	27
Zoe Davis	Personal training of model in project repo	7	26
Josh Dutchik	Created the framework for the model and the backend	8	28
Blake Friemel		6	26
Jack Gray		6	24
Michael Koopmann	Further developed model to make predictions on all allergens	6	26
Jihun Yoon	Contacted faculty members about possible use of servers, reviewed JavaScript and Keras models.	6	9

- o **Plans for the upcoming week** *(Please describe duties for the upcoming week for each member. What is(are) the task(s)?, Who will contribute to it? Be as concise as possible.)*
  - Eric Christensen: Further experiment and start experimenting with the actual data on my personal git branch until I'm confident enough to create a pull request.
  - Zoe Davis: Have a group meeting discussing what we have completed. I will personally bring up my own work since I'm unsure if I'm doing things correctly since I've never worked with AI or training a model before.
  - Josh Dutchik: Continue working on the connections between the model, the frontend, and the backend. Make sure the inputs that are going into the model are correct and work well specifically making sure they are encoded correctly for our model to output the correct allergen
  - Blake Friemel: Run experiments with similar AI models and parameters. Continue working on frontend development for logging in and sending user information to the database.
  - Jack Gray: Make a branch from the model we have on git hub and experiment with it. For now, this will probably be working on the data input and looking at the initial results.
  - Michael Koopmann: Further rework models as I think they might be too biased towards reporting the predictions as false.
  - Jihun Yoon: Hopefully gain permission of use of ISU-hosted servers. Set up a connection to a server. Get hands on experience with the AI Model.

- o **Broader Context**
  - **(1) Updates to broader context effects**
    - ☐ Updates to Existing Effects
      - Since the pandemic, AI in healthcare has continued to expand, which may also come with new regulations or ways to use AI in healthcare. There

aren't any new regulations or ways that affect our project yet, but we plan to stay on top of this just in case something comes up that would affect us.

  ☐ New Effects
    − We haven't found anything new as of yet, but as we continue to work and train the model we will most likely find something new.

- **(2) Plans to demonstrate evidence of positive effects**
  ☐ Precision, recall, and F1 score
  ☐ We can implement cross-validation which is used to evaluate machine learning models that have a limited data sample.
  ☐ We want to implement a feedback system with healthcare professionals that will allow us to update and refine our model based on their feedback and real-world patient outcomes.
- **(3) Ways to address or justify negative effects based on meetings with your team, client(s), and advisor**
  ☐ We will ensure that your project complies with data protection and privacy regulations.
  ☐ We will have an intuitive and user-friendly user interface. A well-designed interface can help mitigate potential misunderstandings or misuses of the AI system.
  ☐ Our AI model can certainly have false positives or negatives. We want to clearly communicate the limitations of our model to doctors who use the model. This will minimize the impact of these errors in clinical decision-making.

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Grading criteria

Each weekly report is worth 10 points. Scores will be awarded as follows:
- **8 – 10**: Progress for your project seems to be suitable. Documentation and hours reported by team members are adequate.
- **6 – 8**: There is scope of improvement both in your report and your project progress. Can consult with instructor/TA after class for further inputs.
- **< 6**: Please talk to instructors/TA after class hours about any difficulties that you/your team is facing.