Date: 28-01-2024
Email: info@myelinh.com
Company: Myelin-H
Website: https://myelinh.com/
Delivery Date: 03-02-2024
(11:59pm CET at the latest)

Software Developer Position

Project Description

You have **two different tasks (one mandatory and one optional)**. You have to complete and submit **at least the mandatory one**. Submitting the optional one would be considered **an extra mile**, which would be greatly appreciated, and a bonus in the final ranking would be given.

Task 1 (Mandatory):

For this first task, you will design and implement three components that together make up a clinical application, where a patient records data, the data gets processed, and a physician can see the results in a dashboard. Every component has a list of suggested frameworks that you can use. Overall, we'd highly recommend using Firebase and setting up the emulators so that the whole application can run locally.

- **Components**

1. Patient Application
The patient application consists of at least three pages:

- ✓ Login: Email + Password login.
- ✓ Home/Profile Screen
- ✓ Patient details (name, ID, ...) are displayed together with a button that starts a recording by navigating to the recording session page for this patient.
- ✓ Recording Session: The patient describes his day while a video is being recorded. Afterwards, it gets uploaded to the backend.

- **Suggested Frameworks:**

- ✓ Unity (preferred) or Android App or iOS App

✓ Firebase (Storage, Auth, Firestore)

2. Backend / Data analysis: On upload of a new video, the data gets analyzed and the results (plots or features) get written to a storage/database.

- **Suggested Frameworks:**

✓ Firebase (Python cloud function: https://firebase.google.com/docs/functions/get-started?hl=de&gen=2nd)
✓ Video analysis (https://pypi.org/project/fer/ or https://github.com/serengil/deepface, ...)

3. Dashboard

- Content: The login consists of at least four pages:

  1. Login: Email + Password login.
  2. Patient Selection: A list of patients where the clinician can select one.
  3. Patient Session Selection: A list of recording sessions.
  4. Patient Session Analysis: The displayed video and the results of the analysis.

- **Suggested Frameworks**

  ✓ Firebase (Hosting, Storage, Firestore)
  ✓ React

- **Requirements**

  ✓ A README should explain what is needed to set up the project and run it
  ✓ No data should get lost (e.g. when upload from the patient app fails → retry)
  ✓ A list of limitations and future work improvements
  ✓ Access rules (e.g. patient cannot access the data of other patients)

Considerations

- We appreciate any extra effort that you put into this task to improve the application by extending it (e.g. email notifications, ...).

- You are **encouraged** to use AI (ChatGPT, Bard, ...) and whatever tool speeds you up to help you with this task. However, please make sure to highlight in your submission and give full credits to parts taken from the internet.

Task 2 (Optional):

Your task is to design a simple **Android and desktop medical interface**, where doctors can upload patient's data and it will classify the patient has multiple sclerosis or not. For that, we are providing brain data of an anonymous patient with a brain disease and a healthy subject alongside a trained machine learning classifier. Your interface should include a login page (it includes login, sign up, sign in & reset password). Once logged in, the user can upload data (provided as a numpy array) for a patient or a healthy subject. The saved classifier should be called and used to predict whether it is an MS patient or a healthy person (for that simply use joblib in Python to read the saved model and directly use model.predict). Thereafter, the interface should visually output if it is a patient (predicted label is 0) or a healthy person (predicted label is 1). Using the interface, a button should allow the download of the results automatically in a PDF document and another result should allow the user to send the result to an entered email address.

Expected Deliverables:
You are expected to submit a demo video of your work. Similarly, you should submit your source code (well documented with comments), your (.exe for the Windows desktop version and a link for the web-based APK for the Android app) alongside a half-page description of how your code works. Similarly, you will be asked to deliver a 10-minute presentation of your work during a video call.

Instructions:
- You will receive an invitation to a git repository where you need to submit your work. Please create a branch whose name is **your_name_Software_Developer_task_Myelin-H** and push your code, video, and the documentation.