Assignment 6

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Testing, in general, is the systematic process of evaluating the performance, functionality, and quality of a product or system. It is applied in various domains, including software development, manufacturing, healthcare, and more. Testing is essential as it helps identify defects, errors, and vulnerabilities early in the development cycle, enabling their timely resolution. It ensures that the product meets the desired specifications, enhances reliability, and minimizes risks. Moreover, testing enhances user satisfaction by delivering a high-quality product that functions as intended, increasing overall efficiency and effectiveness.

My application for the Batchelor thesis is a website that offers people the opportunity to explore and discover their emotions. To access and use the website, each user must own or create an account. Therefore, users will be able to create a new account, log into an existing one and update their account password. Once logged successfully onto the website, users will have access to two different pages targeting users with different levels of expertise in the Artificial Intelligence (AI) domain. These pages include an expert user page and a simple user page. Both provide users with the possibility to record audio files of their voice and further analyze them. The recorded audio files can be downloaded right after they were recorded. Analyzing the audio files means submitting them to the incorporated machine learning models. These models classify and identify the emotions present in the recordings. The analyzed files are saved and can be visualized by users at any time while they are logged onto the website. On the expert user page, users have the possibility to choose what machine learning model they would like to test and see its performance, while on the simple user page, the choice of the machine learning model doesn’t belong to the user. The most suitable model will be automatically assigned to and used. Once the model made the prediction, the result will be displayed on the page, along with a chart bar and it will be automatically added to the list of all created and used recordings of the user. In the chart bar, each emotion with the percentage probability to be reflected in the audio recording is represented.

**Unit Testing:**

One main feature of my application represents the functionality of displaying all the recordings created by the user and analyzed. Since unit testing is a way of testing a unit – a small piece of code that can be logically isolated in a system, displaying the recordings doesn’t imply necessarily too much logic that implies other subsystems or too many classes, so testing this functionality can be done successfully. To test this functionality, I would use black-box testing, I would create the service and repository objects necessary to instantiate the classes and would add for example one, or two recordings, and then call the get recordings method, check its length and since there were only one or two recordings added, their values can also be checked.

**Integration Testing:**

The integration strategy that I believe would be the most suitable one is the Bottom-Up strategy. For the application architecture, I’ve employed a layered architecture, meaning that each layer communicates at most with another 2 layers and all of them are under it. The modules that would need to be tested are the Artificial Intelligence module, where the machine learning modules are written as classes and all the logic behind the prediction/feature extraction is written in that class. This module communicates with the Service module. The next module that should be tested is the repository module, that handles the data that persists throughout the application. This module communicates with the Service module too. The next module shall be the Service module, that is handling all the business logic in what concerns the available functionalities for the user. And the last one should be the Controller module, which handles all the HTTP requests.

**System Testing:**

System testing is essential to validate the overall functionality and usability of my application. Various scenarios need to be tested to ensure a smooth user experience. Among these scenarios, we have the user registration/login and change password. Another scenario should be the recording and the analysis of audio files, the visualization results, and proper assignment of machine learning models based on user roles. The most important scenario would be to test the machine learning models to work in real-word situations. System testing will help identify any potential usability issues, bugs or performance bottlenecks, especially with regards to the machine learning models, which represent the most important part of the application