Hacettepe University

Computer Engineering Department

BBM480 Term Study Plan

Project Details

Title	Class Attendance With Face Recognition
Supervisor	Nazlı İkizler Cinbiş

Group Members

	Full Name	**Student ID**
1	Pelin Fildiş	21827412
2	Enes Taha Elmaci	21990872
3	Abdulkadir Alaca	21827019
4		

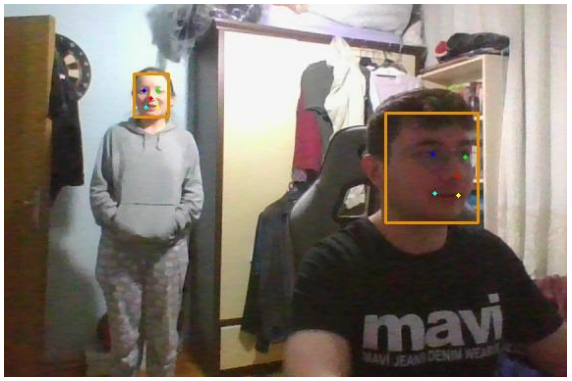
Current State (/ 50 Points)

Explain the current state of the project at the beginning of the term. Especially, emphasize the changes and development progress since the End of Term Development Report of

BBM479. At this point you are expected to include solid evidence that you are making progress, such as screenshots, proofs, experiment results, data outcomes etc.

Our attendance project, which uses computer vision, artificial intelligence, and deep learning models to take attendance from a photo taken in the classroom, continued to be developed during the semester break. The model part of our project is nearing completion with our latest work. We have also completed detailed research to use the most appropriate technologies for the web application part, which is the second stage of our project. We will start the coding and design processes for the web application soon. Although there have been minor setbacks in the roadmap we drew for ourselves before starting the project in the "Project Proposal" document we prepared at the beginning of last semester, we are largely continuing in accordance with it.

In this section, we will explain in detail the work we did during the semester break and the progress we have made. We particularly focused on improving the face detection part of our model. This is because, in the first term, we were unable to reach our desired point due to the deficiencies in our model's ability to detect human faces. To correct this issue, we used the YOLO v5 model that we mentioned in the previous term, because it gives better results than the FaceNet model and Haar Cascade classifier. For example, facenet cannot detect sideway faces or sometimes a face that was tilted . We found pretrained YOLO v5 models and selected the best one. Now we are combining the face detection part and face identification part. After that we will use them in web application. There are some examples of the results from the YOLO v5 face model for face detection.



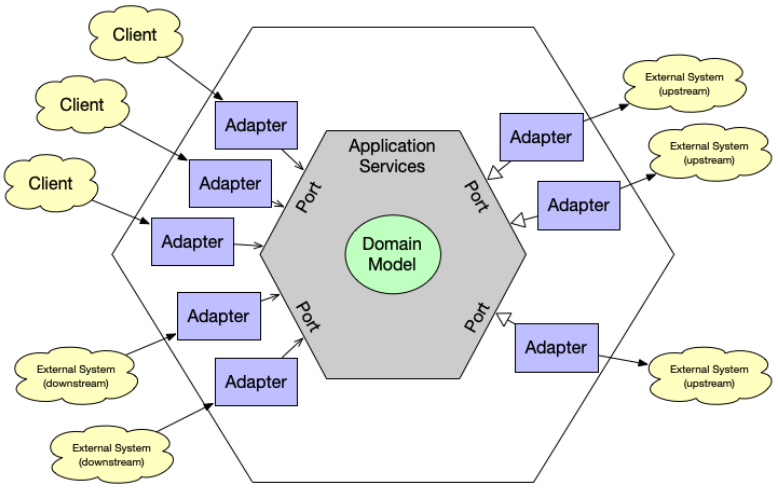
After completing this stage, our goal is to create an executable file and run this application from the backend whenever necessary. Improvements can be made to the model as needed in the future.

During this holiday period, we conducted detailed research on the web aspect of our project. As we mentioned before, Enes will be responsible for the frontend part, and Pelin and Kadir will be responsible for the backend part of our project.

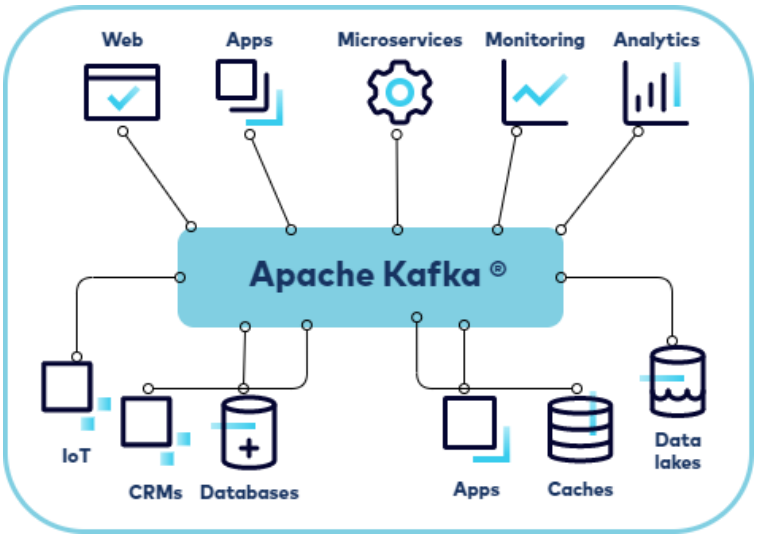
Therefore, everyone continued their research on their own tasks. We combined the information we obtained during the weekly meetings we held and decided on the technologies we will use.

We have decided to use Next.js technology for the frontend part. Next.js is a flexible React framework that provides building blocks for creating fast web applications. Since the frontend part is Enes's responsibility, he preferred Next.js technology that he is familiar with and has prior experience.

It was harder than we expected to decide which technologies, design patterns, and types of databases to use in the backend. The first idea that came to mind for the backend was to use a microservice architecture. We considered using Domain Driven Design (DDD) for each microservice. The reason is that DDD is a more reliable, stable, future-proof design pattern that allows us to reflect business logic in the code and is open to possible technology updates in the future.



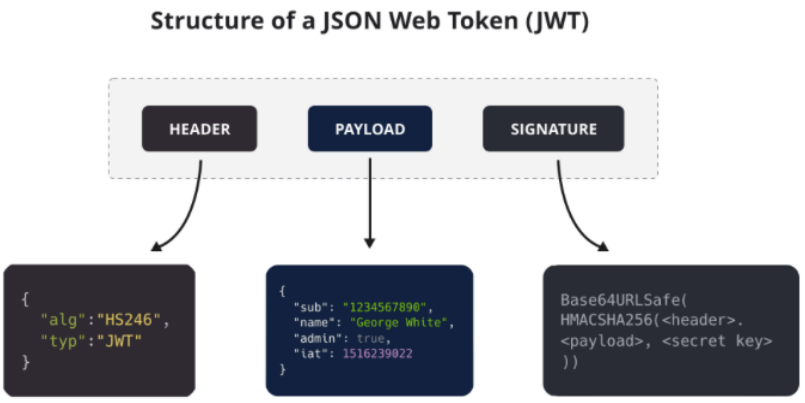
When using a microservice architecture, we will need a queue system for communication between both the backend side and frontend clients, also between the microservices. To solve this communication problem, we are considering using Apache Kafka technology.



Apache Kafka is a distributed streaming platform that is used to handle large volumes of data and to process data streams in real-time. It provides a messaging system that enables the communication between various components of a distributed application, such as microservices, and allows them to exchange data and events asynchronously.

We have decided to use Spring Security and JSON Web Token (JWT) for the user login and authentication part of our system.Spring Security is a powerful and highly customizable authentication and authorization framework for Java applications. It provides a range of authentication options, such as username and password, two-factor authentication, and OAuth. It also offers role-based authorization, enabling us to restrict access to certain parts of the application based on the user's role.

JSON Web Token (JWT) is a standard for securely transmitting information between parties as a JSON object. It is often used for authentication and authorization purposes in web applications.



By using Spring Security and JWT together, we can create a secure and reliable authentication and authorization mechanism for our system's user login functionality.

After deciding on the technologies we will use, we started testing their applicability to our system and making the necessary installations. However, due to the complexity of installing and using Apache Kafka and the fact that the microservice architecture is a detailed method for a system with limited functions, such as the web part of our project, we decided to proceed with faster development methods and add microservices when needed.

At the current stage of our project, we are finalizing the model and commencing the design of the frontend. Additionally, we will begin designing and coding the backend part of our project. It is essential to ensure that the design of the backend aligns with the requirements of the frontend and that communication between the two parts is effective. We plan to use modern front-end frameworks such as React, Next.js to develop a responsive and dynamic user interface. We will also focus on testing and quality assurance throughout the development process to identify and address any potential bugs or issues. Effective communication and collaboration amongst our team will ensure that we will finish our project with all requirements.

Term Plan (/ 50 Points)

Outline your work plan for the second term of the project. Do you have any changes, worth mentioning, related to the time management of the project? Clearly show who is working on what and the personal responsibilities. Are there any changes in the workload distribution?

Despite some setbacks, we are striving to adhere to the workflow plan we established at the beginning of last term. We identified that the main cause of these setbacks was the time lost during the fall semester due to experimenting with incorrect models and technologies. Additionally, the holiday season also contributed to the slowdown in progress during the semester. We hope to overcome these delays by concurrent development process of both the backend and frontend.

As previously planned, Enes will be responsible for the frontend, while Pelin and Kadir will handle the backend. This division of labor will enable us to begin work on the web aspect simultaneously and accomplish a great deal in a short amount of time.

Below, you can see the Gantt Chart we have updated based on the Project Proposal document prepared at the beginning of the fall semester and the latest developments.

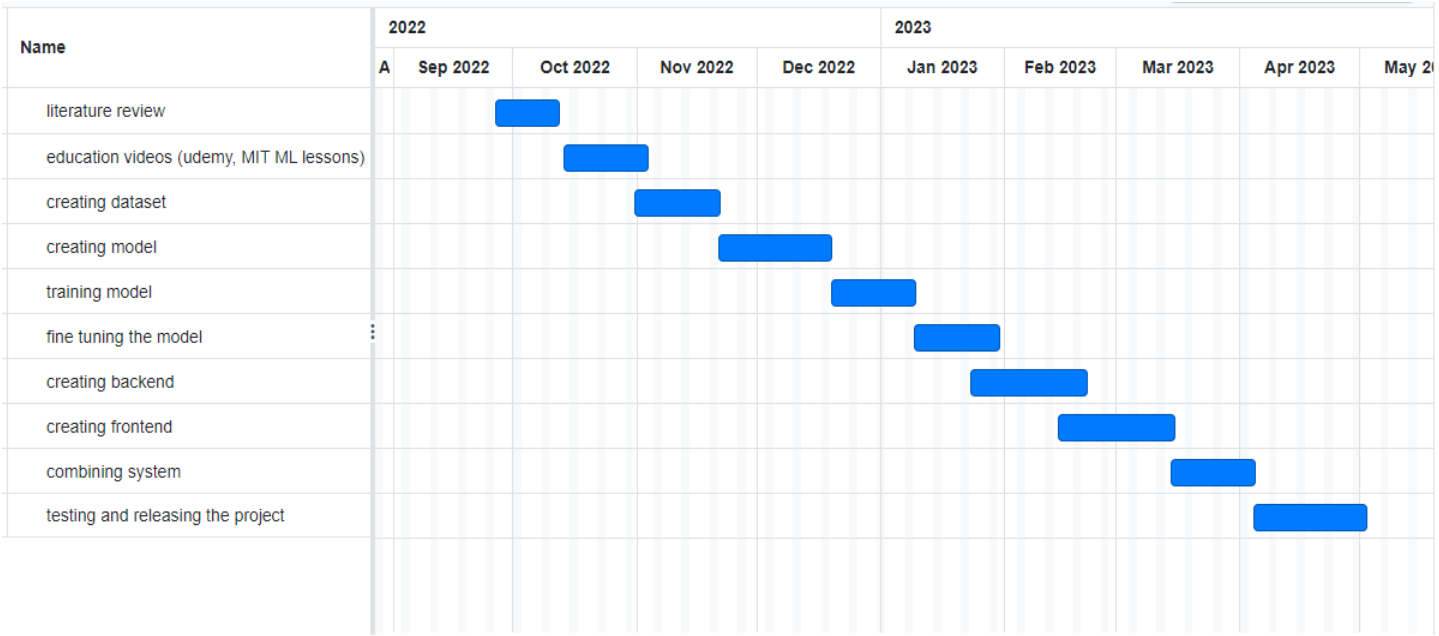


Figure: Project Proposal (First) Chart

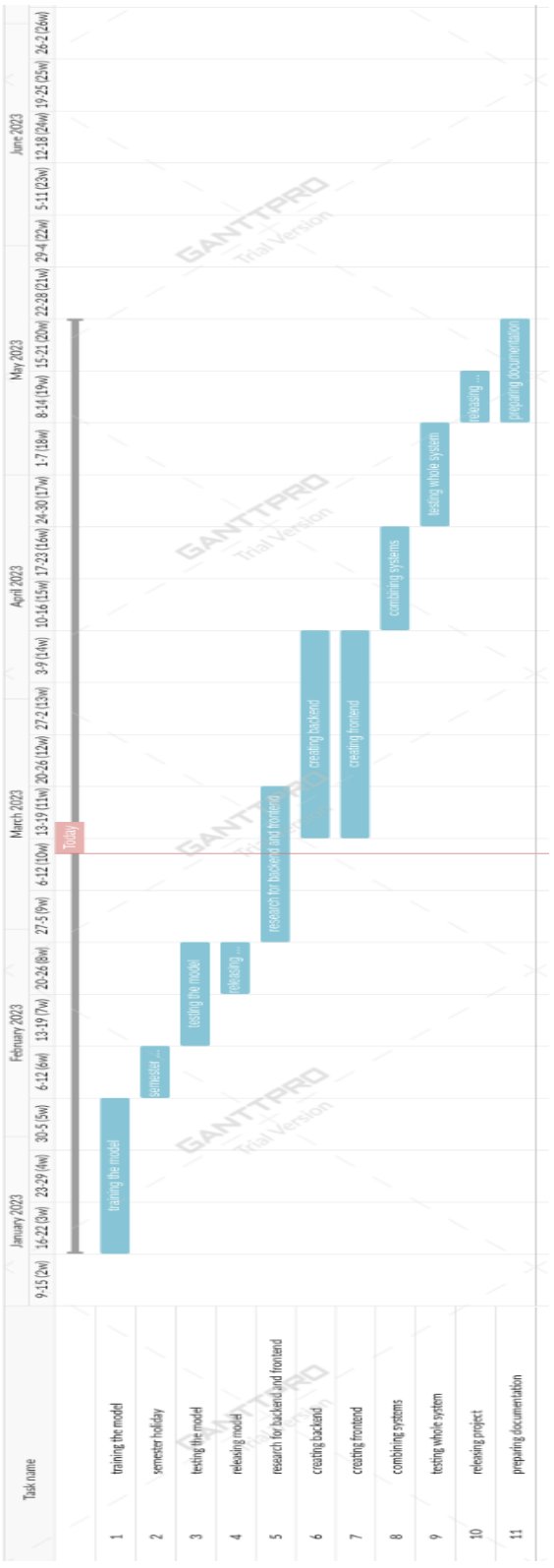


Figure: New Work Flow

We are close to completing the model section of our project. We are working to make the model run through the web service. In the next stages, we will test the system as a whole and make necessary updates. Enes integrated YOLO v5 into the face detection part. With this integration, we aim to have no problem detecting the faces in the class even if they have tilted. He will also be responsible for the frontend in the upcoming days.

Pelin will be responsible for the developments related to one-shot recognition. After testing with photos taken in the classroom environment, necessary improvements will be made.

Due to his experience in backend and database, Kadir will be in charge of the entire database section. Pelin and Kadir will design the backend.