BioTrack Report CS 440 Group 33 Kirtan Patel , Rudra Patel , Nisarg Patel

The BioTrack project is a web application that is designed as a tool to help and educate people about animals in an enjoyable and interactive manner. It can be accessed on both computer and mobile phone. It is an application for students, teachers, and casual users who will use it to find animals, read information, take quizzes, log their discoveries, and earn badges. Teachers too can assign students via the app. The application is implemented in a way that the front end uses React, the back end uses FastAPI/Python, and there is a preloaded dataset.

The BioTrack project is in a way that its users will be able to have more fun learning about animals than through a normal book or static website. Modern students tend to be more inclined toward and even demand interactive tools, which often makes them feel bored with traditional materials. BioTrack managed to incorporate games, leaderboards, badges, and alerts, which all actively help to maintain the interest of users. In addition to this, it also consists of a conservation awareness feature through alerting users of endangered species.

The project is an educational tool that supports environmental consciousness. Exploration of animals is what students gain as a benefit from this web app , while teachers can use it to conduct class projects and users can take a part in the observation of the animals they have found. One reason why the existing apps are either too simple or way too complicated is that they lack gamification, so for instance, regular websites are not interactive, while apps like iNaturalist may be too difficult for young students.

The project is not just one, but has several scenarios. A student can look for an animal, read its specifics, and take quizzes. A teacher can give the project to class, and pupils can work right in the app. A user can see a new animal and get rewards on the leaderboard. The conservation groups can alert users to danger animal by sending warnings. The system administrators can add new animals to the database and keep everything running smoothly.

BioTrack has a variety of users. The most important ones are the students who love to collect badges and acquire new knowledge. Each teacher has a different approach but practically everyone uses the app for homework or research. Conservationists who collect the data and give out warnings are also users who can use this app in effective way . The main purpose of the system is to take care of the backend and keep everything up to date.

The system is subject to a number of rules and restrictions (constraints). The main restriction is that it must be developed using free tools, as there is no budget for this project. It should also be compatible with various devices such as laptops and mobile phones.

BioTrack comes with various absolutely necessary capabilities. The application is supposed to enable the users to search animals, view their profile, take part in quizzes, and mark animals as their favorites. With the assistance of an AI /MLmodel, the application will be able to recognize animals in images that the user uploads. Users will be able to access the information that they have seen before even when they are offline. Additions of new animal records will be done by the admins. The data will need

to be accurate, and the system will have to be fast even when the animal count in the database is very large.

Reliability was also among the main system needs. The machine would be required to run constantly without any downtime. BioTrack has various performance requirements to meet. Loading pages should take around three seconds. Searching and filtering should also take less than a second. AI image identification must be done in five seconds. Instant loading of quiz questions is expected, and quick showing of offline data when the connection is lost is also needed.

There are also accuracy requirements to be met by the app. Exact matches of all animal data with the database are required. Also the image identiofication should atleast recognize the most common animals for this we are using ML with MobileV2Net feature and by using this we will get the most accurate animal from our dataset and the quizzes must grade the answers correctly. It will give 2 tries to the user then will display the correct answer and move on to next question and the scores are also automatic updated .

The report provides details on the various use cases associated with this project. The user will be able to log in, search through animals, see detailed information on animals, take quizzes related to these animals, upload a photo of an animal for identification, and save any animals they find interesting to a list of favorites. Administrators have the ability to add and edit an animal's details. Each use case contains an outline of the steps required to complete the use case as well as the conditions under which it is required, and what will happen in the event of an error.

The project consists of various design components, which explain the structure of the system. The design component includes UML diagrams, class diagrams, sequence diagrams and Data Dictionaries. These diagrams depict how the components of the system interact, as well as the pathways for information flow from the user, through the backend, and into the database. In addition, the project report presents a further analysis of some of the risks involved; for example, if the internet connectivity is poor, the system will not function well unless Offline Mode has been implemented. If an external data source is not updated, then the application will provide outdated information.

It also concludes with a look to the future and some thoughts about what lies ahead. One area of improvement in the future may be the addition of more gamification features, additional animal categories, better A/AI recognition and other tools for teachers. The team also discussed lessons learned during this project, including project management and teamwork, as well as keeping some of the features simple so that they could be finished during the current semester.

Overall, BioTrack provides a complete system for learning about animals with modern and fun educational techniques, along with ways to raise interest in animal conservation. Teachers can use BioTrack to enhance classroom assignments, and students can explore, discover, and learn through the BioTrack system. In terms of usability, the system has been designed to be easy to use, fast and accurate in processing data, comprehensive and secure, and able to work with multiple customers in multiple locations.