Project and Professionalism

(6CS020)

PROFESSIONALISM REPORT

Smart Calculator using OCR

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1. Introduction to project and artefact

Optical Character Recognition is a technology that allows machine to recognize the text whether it is scanned or printed text images or handwritten text. The machine can do further processing on the data extracted from that text. It can be considered same as the combination of human eye and mind. An eye can see the text from some source but mind is the one that actually processes and interprets that text.

The most common use of OCR is to convert hard copy documents into softcopy files such as PDFs. This will make easier to edit the document. There are many other applications of OCR, such as: image text extraction, extracting texts from scanned documents, License plate recognition and answer paper checker. (Patel, et al., 2012)

The main concept of this project is to implement OCR in an android based calculator application. The objective of this application is to scan handwritten or printed numbers and perform mathematical calculations on it. As a whole **Smart Calculator** is a mobile application that uses emerging Artificial Intelligence technology known as "OCR". This application can do mathematical calculations just by scanning the handwritten or printed problems on paper. It can also be used as normal and traditional calculator as well. The main purpose of building this application is to make calculations a little faster and easier to teachers and students.

1. Professionalism aspects
1.1. The social impact

In this modern era of technology, people don't want to waste their time in less important tasks like performing mathematical calculation in traditional ways which are generally time consuming. For that they have calculators, but they still need manual input from the users. They need to follow some sets of guidelines and go through each processes to get correct answer. It would be much more time saving if users don't have to manually enter the data for calculation. If the calculator gets the data with just one click, it will definitely be more efficient and time saving.

1.1.1. Positive social impact

The main objective of this project is to develop an app that can perform mathematical calculations without even having to type to give input. It scans for a mathematical problem mentioned in any paper and gives back the answer. Since it is a mobile application, user can use their camera to scan the problem. The app then extracts the problem from paper using OCR and perform operations on it and return the result.

While checking the answer paper, teachers need to solve the question first by themselves and then only can correct the paper. Students are also in dilemma after solving a problem whether their answer was correct or not. It would be great help for them if they knew if their answer was correct. Teachers and students can check whether their answers were right or not just by a click with the help of this application. Since this app knows all the mathematical rules and principles, users don't need to bother about remembering rules like BODMAS, which they had to keep in mind if they were to perform calculation manually in traditional calculators.

1.1.2. Potential negative social impact

Mathematics is a field of science that shapes our logic and critical thinking ability. Doing math from scratch trains our mind to think rationally. It is always recommended to do basic mathematics on brain. Using automation tools like calculator makes us lazy and promotes brain inactivity. This may result in loss of creativity in human. Using this application by kids may lead them to build the habit of using these kind of systems for every little problems. Nevertheless, this application might be great help in solving advance problems and saving the extra minute of our precious time.

1.2. The ethical issues

Since this project is focused in building an app that can do quick mathematical calculations, majority of users would be students. So the one and only ethical issue that may arise is cheating during an evaluation task. Students have to perform different evaluation tasks like exams and tests. Such tests define their talent and skills. But if they used this application to pass such tests, they will be falsely labeled as talent and when they go to working industry they will not be able to perform well. This results in shortage of capable manpower in nation's development.

To mitigate this issue we have to make the purpose of this application clear to every users that this system's aim is only to make calculations quicker on those fields where knowing basics and principles of calculations no longer matters. This application does not promote cheating.

1.3. The legal implications

As this project develops an android application that is nothing but a calculator, it does not use much resources to operate. It uses mobile camera to capture image of the written problems but does not save it anywhere. Scanning and extraction is done using Tesseract OCR engine which is open source. So, no copyright issue would be applied to this project as it does not infringes the Intellectual Property Right (IPR) of any organization or an individual as stated by *The Copyright Act 2059 BS*. (Nepal Government, 2002)

1.4. The security aspect

At the time of development this application does not include user management system. This means no user data would be collected by the application. But with time, the application may scale up and to access premium features one might have to create a user account. This leads to the collection of user data.

Now this leads to a huge problem of storing user data safely. These days most of the applications store user data in plain text format. Because of this there is high chance of data breach of users. And in this technological era data is everything. So, we need to apply better approach to secure data storage.

1.4.1. This projects approach to secure data storage

For the user management we can use firebase real time database. Firebase provides an authentication system which gives easy and secure way for user log in. Besides, it provides social login options like Google sign in and Facebook sign in. It also provides a real time database to store user information. Sensitive user information like passwords are encrypted using SHA-512 algorithm. (Google, 2021)

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