Project 4 Documentation

1. Introduction

a. What we did for project 3?

i. For project 3 we made an OCR (Optical character recognition) website that can transfer printed and handwritten text from an image and convert it to text that is able to be copy and pasted on a computer.

b. What we did for project 4?

i. For project 4 we added two additional functions to our website, the ability to translate text read form an image and the ability to put that text in a pdf file.

c. Why are we doing this project?

i. When we first came to brainstorm ideas we wanted to do for project 3 and 4, our team agreed upon creating a practical project rather than something that is more entertaining. We want our project to be practical because we feel like we have done a lot of entertaining projects in other classes already, but we lack experience writing practical projects. Also being able to write projects in a group is a rare occasion so we want to challenge ourselves to make a program/website that can not only strengthen our skills in areas that we lack in but also enrich our experiences and resume.

d. What inspired us to do this project?

i. Karen brought up that imagine recognition is a new technology that is very popular right now and she thinks learning image recognition would be a worthwhile experience. She also mentioned that she is a first-generation

immigrant. Growing up, she has always translated for her family so she has always thought image translation would be a very useful application for her parents. Becky also shares the same experience so we thought this would be a great project for us to work on.

2. Describe how your team integrated code from the team members? (250-350 words)

a. Which Integration Strategy do you think your team used?

i. Our team used the sandwich integration strategy. The logic artifacts are implemented top down while the operational artifacts are implemented bottom up.

b. Explain why

i. The sandwich integration works best with the characteristics of the project that we are working on. Since the backend, operational artifacts, can be run by itself and have its output printed out in the terminal, it is best if we use bottom-up integration to slowly implement and test everything. With that said, the frontend end, logic artifacts, can also be implemented and designed separately, so top-down integration would work best. As a result, we end up with sandwich integration. After the two parts are implemented separately, we could integrate them easily. For parts of the backend and frontend, each feature can also be implemented individually and no integration strategy is really needed. For example, we have the generation of PDF and translation as part of the backend. The integration of these features are straightforward and could be done easily because they do not affect each other. Each portion of the code is completely separate. Then

the frontend would just connect everything together on the application page when everything is working and implemented accordingly.

c. Since the frontend and backend teams worked separately, implementing the principles of a REST API was important for simple integration. Our server has a single endpoint for processing the data from the frontend, which conforms to the REST principles. Since there is no maintained state in the server, all the frontend team had to do was implement a straightforward AJAX request to the server's endpoint.

3. Deployment plan (500-700 words)

a. What are the steps required to deploy your project?

i. Regarding deploying our project, our goal with deploying is to make our program available to as many people as we can. If we were to deploy this project we plan to make it an app and a website. A website is helpful because an application does not need to be installed before use. In addition to that, a website does not take up any storage on the computer, and does not require users to manually download an update when a new version is released. Also, a website can be accessed through any device that can be connected to the internet. So, that should be able to cover a good range of users. We also thought releasing our program as an app would be very helpful because I personally just prefer applications over websites on my mobile devices and tablets. I think applications are more stable on these devices as opposed to websites, and designs in an application are just cleaner on devices such as tablets and smartphones. Another plus to

applications as opposed to websites is that certain features of an application are functional even without the internet. In addition, the people who need the help of this application may have problems with accessing the internet because of language barriers to begin with. By making it an application, it would provide easier access. We may also develop different language versions of the application. With the points mentioned above, we believe releasing an application in the app store would be worthwhile. We would have to test and run our app more thoroughly to ensure that it is bug-free and does not crash before submitting our app for review to the app store.

b. Who is the potential market?
    i. Like I said, the idea of this project was inspired by some of our team members being first generation immigrants coming from a bilingual background. They grew up having to translate everything from monthly bills, spam commercials, parent teacher conferences to medicine descriptions, and it takes a whole lot of time typing everything into google translate. Coming from such a background they have always thought a photo recognition translator would be a very helpful tool for families like theirs. Just taking a picture and getting everything translated would save them a whole lot of time, not to mention human translation especially that of a child is prone to a lot of errors therefore we believe such a website would be exceedingly necessary. However, we believe our potential users are much wider than what we have mentioned above. We have a global

economy, people also go on vacations all the time, and just on campus, we have numerous international students. We believe our program can be helpful in all of these situations and benefit the majority of the population.

c. What will it cost to deploy it?
    i. $25 one-time cost to publish in Google Play store
    ii. $99 annual cost to have app in apple store
    iii. $17.99 to $84.99 per month VPS hosting (website)

4. Maintenance plan (500-700 words)

a. How much will it cost to maintain your product for the next year?
    i. $110,500 x 5 = Average annual salary for a team of 5 programmers
    ii. Employee benefits
    iii. Workstation – rising desk, ergonomic chair, two screens, pc, office, internet, and electricity
    iv. $99 annual cost to have app in apple store
    v. $215.88 to $1,019.88 annual cost for VPS hosting (website)
    vi. Domain name: $188,888
    vii. Advertising: $1000 / month

b. Maintenance on our project could be restricted to simply hosting the app and paying for server costs, but it's more interesting to consider an active development scenario where we seek to improve our app, increase its functionality, and drive it to a broader market. For this we foresee that it would be beneficial to hire a team of five programmers. Our team currently has five programmers. However, splitting our time between classes, extracurriculars, etc.

leaves a relatively small amount for this project. If five developers were to improve this project full-time, we foresee significant improvements in quality and usefulness. For one, we would be able to add more features: the translate function could be expanded to more languages, we could add a test suite for the backend, we could improve the PDF export function, and so forth.

c. Hiring developers brings a plenitude of benefits, but also costs. The first is employee salaries and benefits. A reasonable salary for an experienced engineer is $110,500, which would multiply to over half a million dollars with a full team.
d. Costs of developers don't just include salary. A business plan must factor in the cost required to create a reasonable workspace. Between furnishing an office and paying rent in an attractive city, this could amount to as much as $10,000 a month.
e. More developers would let us create an iPhone app and upload it to the app store in order to increase our target market. This would incur a cost of $99 to Apple.
f. Most importantly, we need to pay for servers to host our web app. Adding five developers would massively increase our app's number of features and target market, so one can imagine an influx of users on our site. As a result, we could incur $215.88 to $1,019.88 annual cost for VPS hosting.
g. As a prerequisite to VPS hosting, we need to acquire a domain. We believe a short, catchy domain name would be best for attracting users and marketing our app. One such domain name would be reader.io. Such a to-the-point name would increase potential users' trust in our brand and make them more likely to use our app. This domain name would require an initial investment of $188,888, but we

believe given the already significant capital invested a great domain name would be worth it to attract the most possible users.

h. Advertising would also be a significant source of users. We think spending $1000 a month on Google Ads running advertisements on YouTube and other popular websites would be a primary stream of users, some of whom would become repeat customers.

5. Final Thoughts

a. How happy are we with the turnout of our project?

i. We think we have accomplished our goal but there is still a long way to go with this project. We can improve our handwriting recognition, after we learn more about machine learning. We can add more features to our program such as the ability to share what is translated to someone else using email. Maybe we can even work on other areas such as face recognition. There are still more areas in image recognition that we hope to explore, and more details to our program that we hope to refine.