Capstone Project Proposal

Inna Ivanova Ivanova

Business Goals

Project Overview and Goal What is the industry problem you are trying to solve? Why use ML/AI in solving this task? Be as specific as you can when describing how ML/AI can provide value. For example, if you're labeling images, how will this helps the business?	**Student Assistant** Students have a lot of different subjects to study. Studying can be quite challenging sometimes and students get bored by the traditional way of lecturing at universities as explained in the article from John G. Sharpe from 14.11.2018 "Students really do get bored at university – but why?" (https://www.advance-he.ac.uk/news-and-views/students-really-do-get-bored-at-university). We can use AI/ML to make student experience better. It would be nice to have a student assistant, a chatbot that helps students to learn better. The assistant should be helpful for the assignments in the different subjects the students have, and also give them tips on how to complete the assignment.
Business Case Why is this an important problem to solve? Make a case for building this product in terms of its impact on recurring revenue, market share, customer happiness and/or other drivers of business success.	The problem to solve here is making studying more engaging and also ensuring that students do their assignments. The major impact of the assistant will lead to an increase in students' learning success. If the project is successful it can be expended, not only to university students but also to pupils. Having the assistant work in English would enable its usage in the whole world. The market share will be global. The usage of the assistant would market itself by word of mouth. The usage of the assistant would be through a one time lifelong access fee.

Application of ML/AI What precise task will you use ML/AI to accomplish? What business outcome or objective will you achieve?	The task to accomplish would be to ask students which subject they want to study, show them the current assignment as well as due date and some tips on how to solve it and to track progress. To implement that we can use a common conversational AI. For the first version (before we have any kind of data) we could use a chatbot with a decision tree algorithm architecture behind it. The chatbot will support the student learning success. It will also follow pre-scripted chat texts in different cases. After it has worked for some time and we have gathered some amount of usable data with the permission of the users, we can exchange the architecture of the machine learning model with a more advanced deep neural network using natural language processing. The main business outcome here is the collection of data, that would help develop a better and more complex assistant with time.

Success Metrics

Success Metrics What business metrics will you apply to determine the success of your product? Good metrics are clearly defined and easily measurable. Specify how you will establish a baseline value to provide a point of comparison.	I will use the AARRR framework (acquisition, activation or conversion, revenue, retention and referral) to measure the success and progress of the product. Since it is a new product the baseline will be set to zero and we will improve on the metrics step-by-step. The acquisition cost will be kept low as it is going to be advertised by the participating university and will be distributed also by word of mouth. Activation will be positive if the students download and sign in in the app. Revenue will come from paying the one time life long access fee. The retention will show how often the students are actually using the app. Finally, it would be possible to share the app, which should boost the referral rate. Additionally, the NPS - Net Promoter Score metic can be used in order to understand how satisfied the students are with the product and if they would spread the usage of the app by recommending it to their peers.

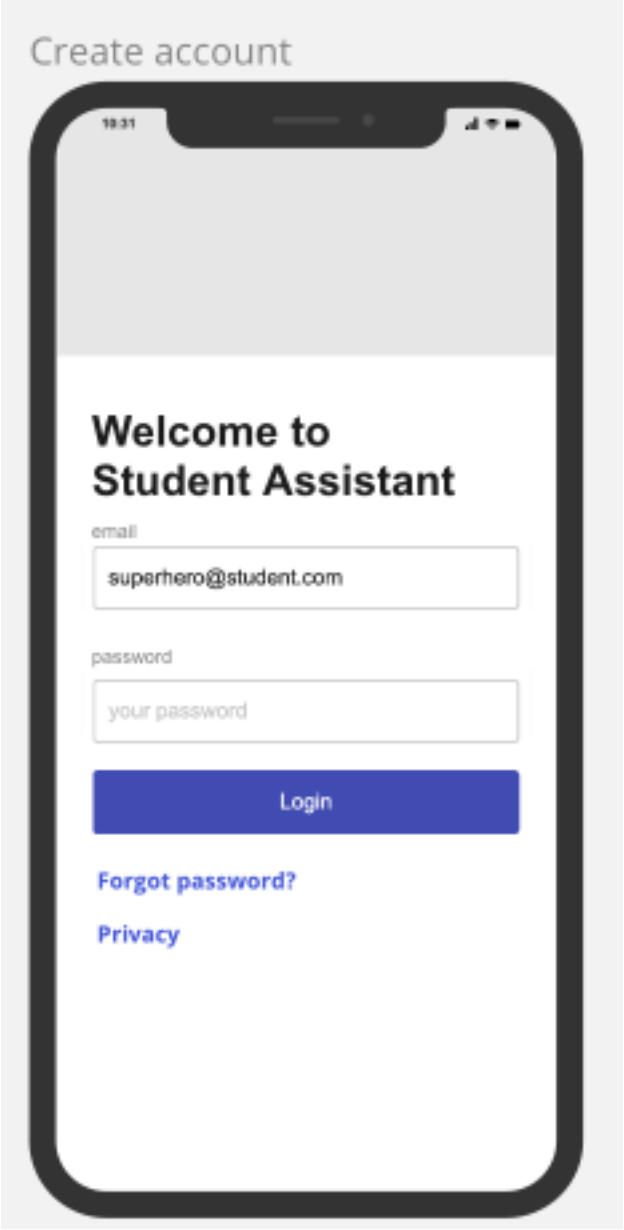
Data

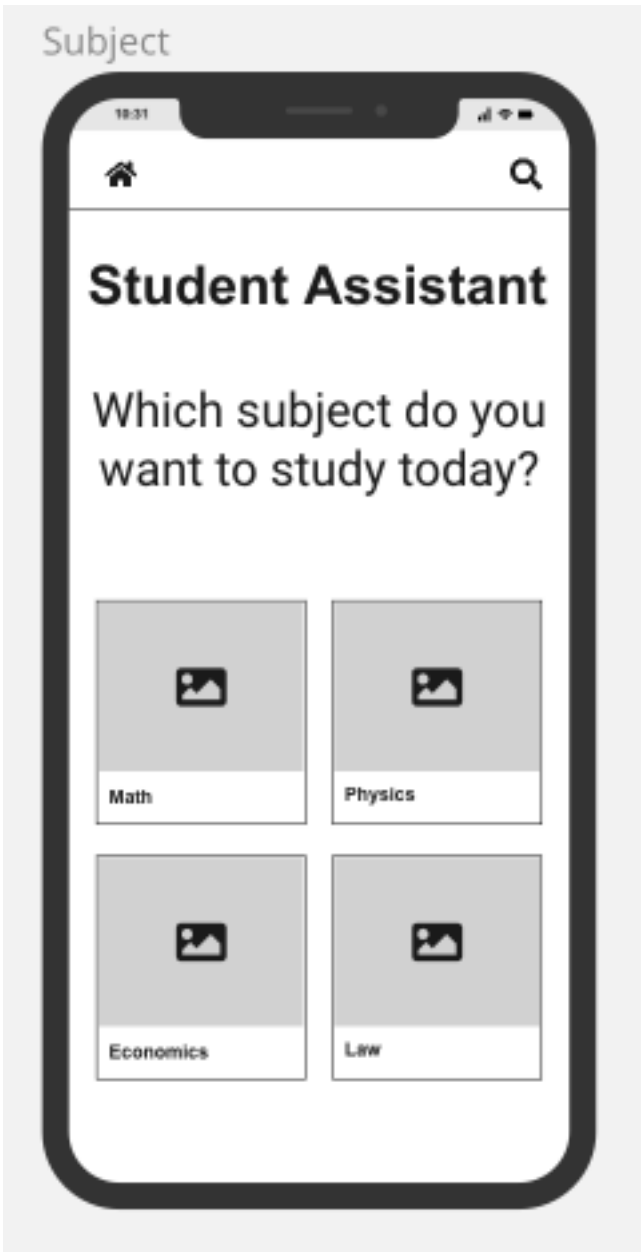
Data Acquisition Where will you source your data from? What is the cost to acquire these data? Are there any personally identifying information (PII) or data sensitivity issues you will need to overcome? Will data become available on an ongoing basis, or will you acquire a large batch of data that will need to be refreshed?	The data will be collected from the users. The data should come for free then, the students will have to allow the usage of their data for the improvement of the product. The data will be coming in on a regular basis as the usage of the app increases. With time data will accumulate. There will be personally identifying information, which will need to be anonymised.
Data Source Consider the size and source of your data; what biases are built into the data and how might the data be improved?	The students will be asked to select which subject they are interested in and will be selecting further options about the assignments. The size of the data will grow with the number of users. Unfortunately, there is no guarantee that the incoming data will be balanced. For example it is possible to have more white males using the app. But since the chatbot will follow a scripted conversation in the beginning there shouldn't be any issues with that. With time when the data is collected, one can contemplate on how to make the model better using the gathered data. Better results might be achieved when balancing the training data used for the model.
Choice of Data Labels What labels did you decide to add to your data? And why did you decide on these labels versus any other option?	The data labelling process could be build-in, asking the student to classify first by selecting a specific category, before entering a question. Another option would be to leave the data unlabelled and to use machine learning methods that are capable of handling this type of data e.g. unsupervised learning.

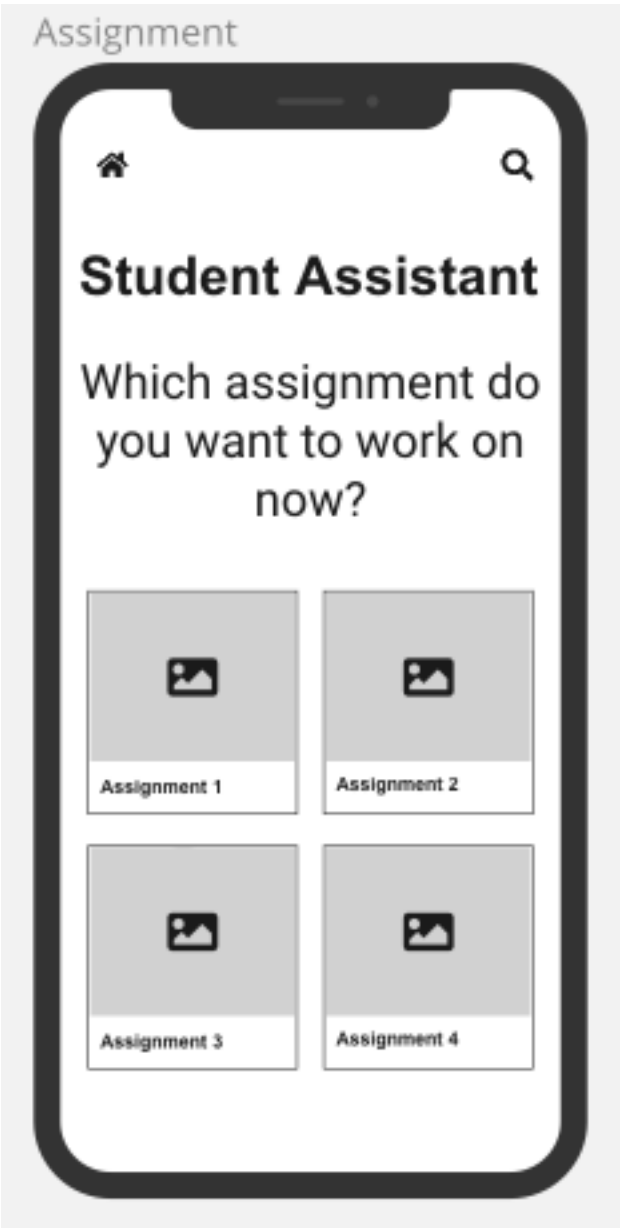
Model

Model Building How will you resource building the model that you need? Will you outsource model training and/or hosting to an external platform, or will you build the model using an in-house team, and why?	The model will be build by the in-house data science team. This is prudent choice because it enables the continuous monitoring and optimising the used machine learning model. If the team decides to use an external platform to host or process and further analyse and use the data, this should also be an option, but it will be decided by the experts in the field. In general this should be a key competence of the company, that shouldn't be outsourced.
Evaluating Results Which model performance metrics are appropriate to measure the success of your model? What level of performance is required?	For the neutral network, accuracy, precision, recall and the F1 score would be suitable performance measures. We should aim of course for the highest performance level possible, but let's say we can set our expectations to an accuracy of 90%.

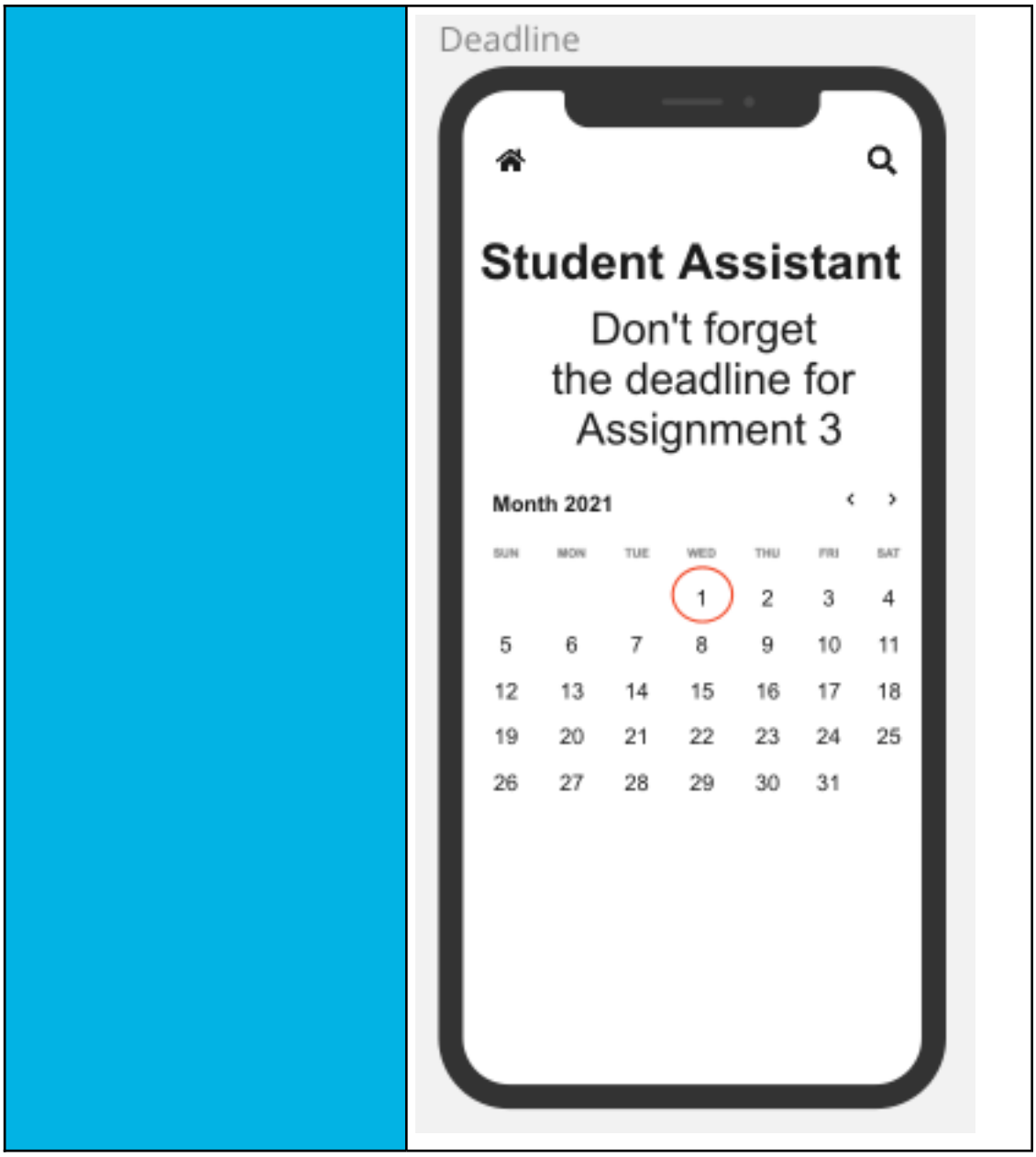
Minimum Viable Product (MVP)

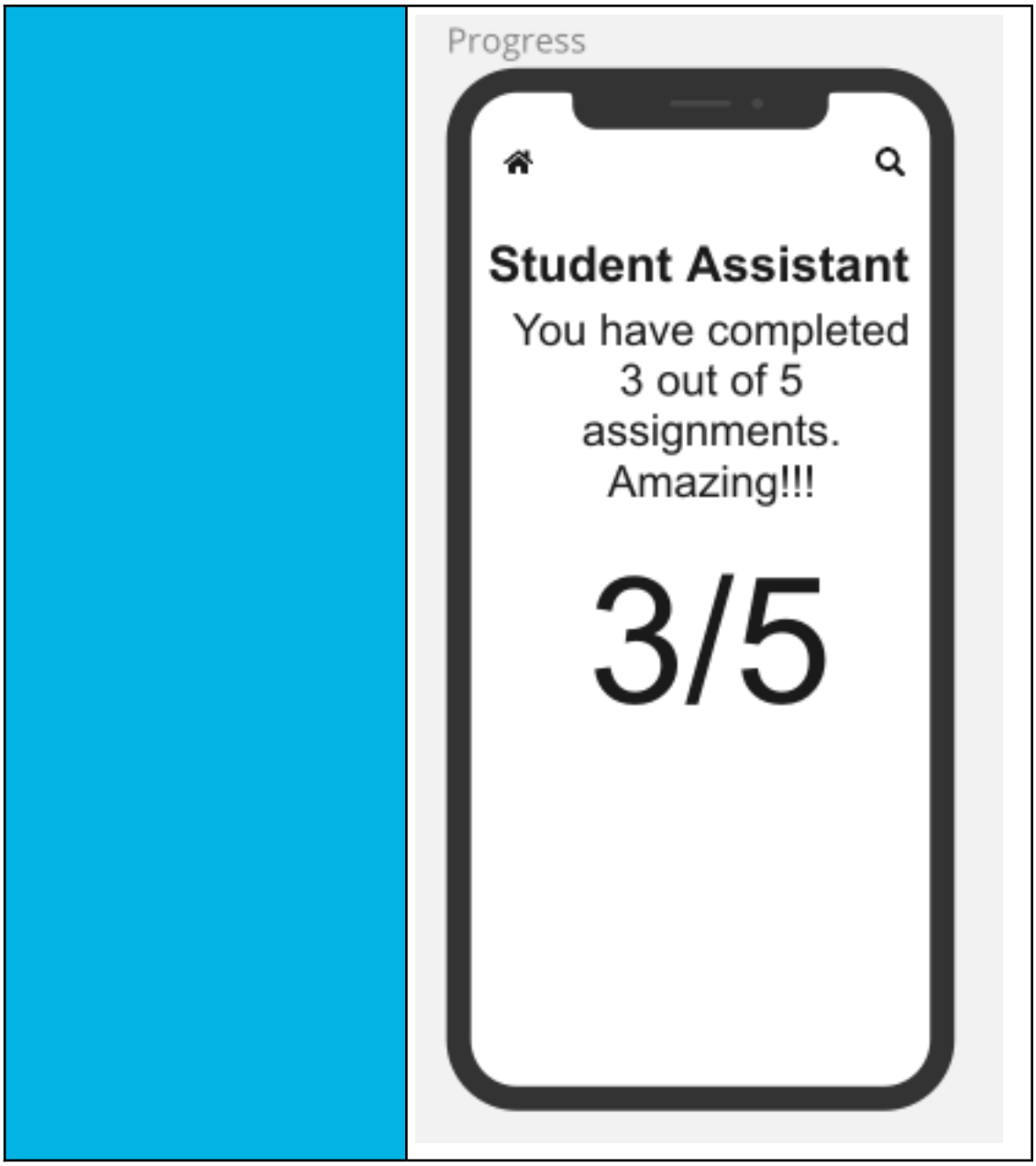
Design What does your minimum viable product look like? Include sketches of your product.	**Sketches** In the sketches the chatbot part is currently displayed as text, but you can imagine it for example as a chat message. 


Subject
Student Assistant
Which subject do you want to study today?
Math
Physics
Economics
Law


Assignment
Student Assistant
Which assignment do you want to work on now?
Assignment 1
Assignment 2
Assignment 3
Assignment 4


Tips
Student Assistant
Tip 1
Did you try this?
No
Yes
Tip 2
Did you try this?
No
Yes
Tip 3
Did you try this?
No
Yes


Deadline
Student Assistant
Don't forget
the deadline for
Assignment 3
Month 2021
SUN MON TUE WED THU FRI SAT
1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 31


Progress
Student Assistant
You have completed 3 out of 5 assignments. Amazing!!!
3/5

Use Cases What persona are you designing for? Can you describe the major epic-level use cases your product addresses? How will users access this product?	The main persona the product is designed for is a student. **Example Persona:** - Name: Study Max, - Details: loves to study - Goal: wants to finish assignments as soon as possible to then have more pleasure time **Use Cases / Product Features:** - The app can be downloaded from the app/play store - The students can sign up - The students can log in - Ask students which subject they want to study now - Show them the current assignment - Show due date for that particular assignment - Show some tips on how to solve it - Track progress - Motivate students **User Review:** - According to the users, the usage of the app is exciting and satisfying. - It helps them stay on track and motivates them - It offers helpful tips on how to solve the assignment
Roll-out How will this be adopted? What does the go-to-market plan look like?	There should be some timeline as a guideline. For the first release (pre-launch) the development time is set to 1-2 months. Then the first release should be launched in the app store. In the next 3-4 months adjustments to the model should be done and data should be collected. After the first 6 months of gathering data (post-launch) the transition to a more sophisticated model should be done.

Post-MVP-Deployment

Designing for Longevity How might you improve your product in the long-term? How might real-world data be different from the training data? How will your product learn from new data? How might you employ A/B testing to improve your product?	The workflow of the project will follow the famous build-measure-learn feedback loop by Eric Ries. The goal will be to always learn from feedback and data. To achieve continuous learning, as long as the model is performing poorly and not to the set expectations, producing low confidence predictions, there should be humans integrated in the loop, until high confidence predictions are achieved, then the advanced model can be taken into production. The accuracy of the model can be improved by smartly selected and targeted training data. Another way to iterate and improve on the product are A/B Tests. They enable making informed decisions by using a scientific method, as explained in the article from the Netflix Technology Blog on the 07.09.2021, called "Decision making at Netflix." (https://netflixtechblog.com/decision-making-at-netflix-33065fa06481) What they basically do is formulating a hypothesis, creating an experiment, gathering empirical data from the experiment, which provides the evidence for or against a hypothesis. Then they make a conclusion, make an informed decision and create the next hypothesis to repeat the process. This process can be applied to any product.
Monitor Bias How do you plan to monitor or mitigate unwanted bias in your model?	As explained in the Monitor Bias video from the Udacity course AI Product Management, there are different types of biases possible, including data bias, model bias or annotations bias. The data can be unbalanced, which can lead to low model performance, there might be human errors in the annotated data, or the model itself might generate a biased outcome. To overcome this possible disadvantages, it makes sense to include a human in the loop, to be able to better monitor the model and its outcomes. Also it is a good idea to have a diversified cross-functional team, so that more perspectives are represented in the model architecture.