Capstone Project Proposal

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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 help the business?	The industry problem I am trying to solve is providing a simple/easy to use package for small businesses to access sentiment analysis across various review platforms such as Yelp. By using ML/AI in solving this task, it will save small businesses time in reviewing every single review across different platforms; using data, they will be able to view exactly what parts of their business are driving positive or negative reviews. The business can continually improve based on this information As an example, a local restaurant might use the package to determine which items are reviewed positively or negatively quantitatively. With this information, the restaurant could then narrow that to what terms are used frequently relative to the reviews to find insight what should be continued to be done or what should not be done / changed.
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.	This is an important problem to solve as it gives direct access to insight into what continues to drive business or the opportunity change something that is making them lose business in a quantitative way. Regarding recurring revenue, machine learning can go through the reviews and classify specifically what has made a review positive. By knowing this information, a business can continue doing what it has been doing well. As for customer happiness and market share, a small business can also investigate what the trends of reviews that are negative or even suggestive. With this information, a small business can target specifically the areas where it needs to improve to drive more success.

Application of ML/AI What precise task will you use ML/AI to accomplish? What business outcome or objective will you achieve?	The precise task that I will use ML/AI to accomplish is to build multiple levels of classifiers. The top-level classifier will decide on a review if its positive or negative. From there, other classifiers will be used to determine the components of a positive review or the components of a negative review. Ideally the business outcome I want to achieve is increased revenue. Specifically, through the data that ML/AI provides the business, I want to see that these changes made in response to negative or suggestive reviews have directly caused more business.

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.	The main business metrics I will apply to determine the success of the product is customer experience, revenue gain, and faster decision making. Although this might be dependent on the type of small business, I think these areas will be consistent across businesses. Baseline will be all the above metrics measured prior to deploying the model and making any changes. After running the model for reviews over say a three-month period and then implementing the changes, giving another three months, we can compare the results. Customer experience can be measured by the proportion of positive reviews relative to negative reviews from before and after. Revenue gain is also straight forward as it can be measured by a period before the model and a period after changes from the model deployment. As for faster decision making, this is a little tougher to be measured. But metrics can be taken as to how long it usually took to implement new products or items as a baseline relative to how long it now takes to implement new products or items after the deployment of the model.

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?	Data will be sourced from customers, ideally immediately at the point of sale or use of service. As an example, I would encourage customers to leave a review immediately at a restaurant. Cost should be very minimal, perhaps can offer a free item if a customer leaves a quick review. This could potentially compensate by slightly marking up prices of other items higher. There will not be any PII involved. Data would be available on an ongoing basis if customers continue to buy or use the product.
Data Source Consider the size and source of your data; what biases are built into the data and how might the data be improved?	Given that I will likely insist on the small business to offer something in return for a customer leaving a review, the bias maybe more positive in the reviews left. The data might be improved if it is made clear to customers that they should leave positive or negative reviews based on what they truly believe. Perhaps rather than negative reviews, I would encourage them to leave any type of suggestions or feedback.
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 labels will be dependent on the level of the model as well as the type of small business that I am assisting. At the highest level, the main labels will be positive or negative review. After this initial model, the following models will be dependent on the type of small business. Continuing the local restaurant example, I can further classify positive or negative reviews into specific areas such as food or dining experience. The model can go even further into what exactly about the food generated a positive or negative review. The main limitation to this approach is that the model(s) will need a lot of data, so arguably the data collection will be the most important part of the entire process.

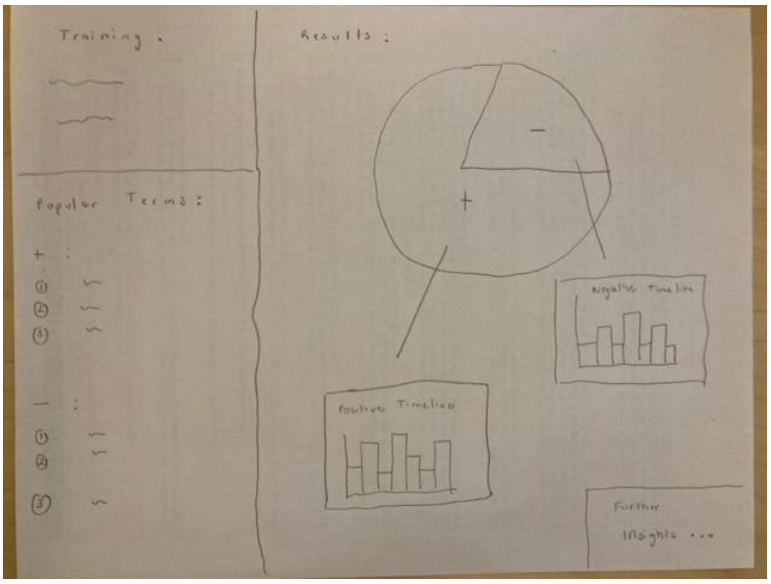
Model

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?	Given the model details, I think it would make most sense to generate the model in house. To be honest, I think most open source software would provide the necessary tools. The model itself should not be very complicated to do some basic classification and natural language processing tasks. I think the main selling point on this product is the ease of use and presentation to a small business. I want to build a product that is very simple to use and provides visualizes that anyone even without a technology background can use. The main difficult will come from data collection and the quality of data collected.
Evaluating Results Which model performance metrics are appropriate to measure the success of your model? What level of performance is required?	The model performance metrics that are most appropriate to measure the success of my model are correct classifications of reviews. The model performance would have to be compared against a human classification. As a baseline, I would think at least 80-90% of the reviews need to be classified correctly especially if we will be using other models to classify further.

Minimum Viable Product (MVP)

Design What does your minimum viable product look like? Include sketches of your product.	The minimal viable product (sketch below) would be one model that classifies positive or negative reviews. There should be a basic dashboard that is provided in the UI that provides detail on the reviews. Components that might be useful would be basic natural language processing which would provide the user with information such as which terms were used the most frequently. Further models would provide further insight on what exactly the sentiment behind these terms was, but that would be beyond the minimal viable product.
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 persona I am designing this for should be with someone for minimal or no ML/AI experience. It should be very easy to use and easy to understand. Small business owners should not be spending any excess time on figuring out how to work the product. Data visualization and UI will be just as key as the model itself. The product should be available online and all information stored in the cloud. All the capabilities of the model should also be done on cloud so that anyone with a simple web browser will be able to use the model.
Roll-out How will this be adopted? What does the go-to-market plan look like?	The model would be adopted through multiple phases. This can be broken down into, data collection, running of the model, implementation of model suggestions, and then finally review. The most important would be the collection and importing of customer data. The product will only be as good as the quality of reviews it is using. After a collection process (ex. three months), the model can be run effectively. This take the least amount of time. Following the running of the model, the business will then need to figure out a plan on what to implement. The next step would then be the implementation of what the model suggests. There should be enough time that the changes take shape. During this time period, data should be collected again for the model to review and continuously improve.

Sketch



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 product can be improved in the long term by implementation of newer ML/AI models that might be faster. Real-world data might be different in training data in that consumers preferences might change which raises the importance of continually collecting data in the form of reviews to capture these potential changes. A/B testing can be implemented in deploying two different models using the same training data to see what they might classify. This would be useful to see if the two models both show the same trends in the data or are showing something different. There would be more confidence given the results if both models show the same results.
Monitor Bias How do you plan to monitor or mitigate unwanted bias in your model?	In order to mitigate bias, we will need to make sure reviews are not encouraged too positively. I think in order to mitigate bias there are two ways to deal with it: at the source and the training data used. If there are too many positive reviews, I would have to throw out some of the positive cases to balance the difference between positive and negative reviews.