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Problem Solving & Software Design (MIS3640 - 01)

Term Project Proposal

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**Bid Calculator/Analyst Project Proposal**

**1. The Big Idea:** What is the main idea of your project? What topics will you explore and what will you generate? What is your minimum viable product? What is a stretch goal?

The main idea of our project is to create a bid calculator/analyzer to make a process within an existing business more efficient and intelligent. The company, MainStreeter, who we are creating this solution for is a company started by one of our team members, Christopher Kennedy. MainStreeter is a non-emergency medical transportation company that focuses on perfecting relationships with the brokerages that they have contracts with. The company also focuses its efforts on being the lowest cost provider in comparison to its competitors. In this industry, in the state of Massachusetts, transportation providers can make a bid on trips that are put out to bid by the brokerage. In the end the trips are awarded to the lowest cost transportation provider. MainStreeter has been looking for ways to calculate bids that they believe will result in the lowest bids, compared to competitors, and then evaluate whether each trip makes financial sense to take on.

Our bid calculator/analyze will utilize Python to solve this problem. It will draw upon continuously updated historical data (past trip data and what other vendors bid on all trips) to make an educated prediction based off of variables such as trip length, trip type, etc. what the average lowest cost has been from the past. The software will then undercut that lowest cost average by a small amount and generate a calculated bid that MainStreeter can submit to the brokerage. As a team, we will have to first work to generate a linear regression function that will most accurately predict the average lowest bid. Once the function/algorithm is determined we can then turn to Python to begin working to create the code that will integrate the algorithm. This will face the user on a website that will be utilized by only the company where variables such as trip length, trip type, and trip time will be inputted and then a dollar bid will be calculated and returned to the user. This is our goal for a minimum viable product.

A stretch goal for our project would be to also have the software predict whether or not the individual trip would be profitable to take on based off of what MainStreeter per trip expenses are. This will be difficult because we don’t have too much historical data on average costs per trip for MainStreeter based on different variables because MainStreeter is a brand new company and has yet to take on too many trips. They are currently running mostly market research with a minimum viable product and have yet to fully launch and scale operations. If anything, we’ll be able to create a template that we can use later when we have hard, accurate expense data.

**2. Learning Goals:** Since this is a team project, you may want to articulate both shared and individual learning goals.

Python is a brand new language for both of us. From working on this project, we hope to have a clear logic for the bid calculator and a good sense of how to code with python through practicing. Through this process, we are excited to learn how to integrate Python code and our bid calculator software with other coding languages to create a something that is visually appealing facing the user. We will also learn how to work with APIs, such as google maps for location or another API for gas prices. Another focus we will work on refreshing our skill in QTM by creating a linear regression, a prediction model. With the help of the linear regression we are hoping to learn how to optimize the bid calculator. Lastly, we want to improve our problem solving skills. We are programmers in the making but we want to be experts.

*Chris:* On top of learning different Python strategies, I also plan to learn a lot more about my business and the industry we are in from working with all the historical data and all of the analysis we will be doing. I will be forced to look at aspects trends of the industry that I have yet to discover before working this closely with industry data.

*Stephanie:* My biggest goal is to be able to learn python and be able to converse about python with others. I am graduating with an IT concentration and am applying to different IT jobs. I want to learn how to express what I have learned in python in interviews and be able to be tested on python. Many of the interviews have coding challenges and I want to be able to have an idea and feel confident about the language.

**3. Implementation Plan:** This will probably be pretty vague initially. Perhaps at this early juncture you will have identified a library or a framework that you think will be useful for your project. If you don't have any idea how you will implement your project, provide a rough plan for how you will determine this information.

Our first step for implementation is creating a linear regression that serves as the backbone for our bid calculator. We are already working on conducting research to better understand how to use algorithms, linear regressions, and prediction models in Python. We have been and will continue to use the website Kaggle.com to look at past competitions and projects that used linear regression or any data science within their code. This will give us ideas on how to integrate into this our code. We will also potentially reach out to our past QTM3 professors for any help we need in generating this function. Once we have created this, we will be able to begin working with Python.

We will then use Python to create the software behind the bid calculator drawing upon our skills and strategies learned in class as well as through other projects on Kaggle.com for reference. After that, we will then figure out how to integrate our Python code into something that will face the user on a website. We will draw upon our knowledge from what we learned in Web Tech with HTML and CSS and then research other projects that have integrated Python code with HTML and CSS languages. We will also continue to utilize google throughout this process, making sure to search by using accurate and comprehensive search phrasing.

**4. Project schedule:** You have 8 weeks (roughly - I know thanksgiving week is off) to finish the project. Sketch out a rough schedule for completing the project. Depending on your project, you may be able to do this in great specificity or you may only be able to give a broad outline. Additionally, longer projects come with increased uncertainty, and this schedule will likely need to be refined along the way.

Week 1: 10/08/17 - 10/14/17

* Project Proposal due on 10/12/17
* Research linear regressions and prediction model strategies within Python

Week 2: 10/15/17 - 10/21/17

* Continue regressions and prediction research
* Determine variables that will be used and what the inputs will be
* Work on the linear regression model for the bid calculator
* Review notes from QTM
* Come up with the logic on how to integrate model into our Python code

Week 3: 10/22/17 - 10/28/17

* Finalize the linear regression/prediction model
* Start working on the Python code for the bid calculator
* Meet with professor Zhi Li

Week 4: 10/29/17 - 11/04/17

* Continue to work on Python code
* Reevaluate if we need more historical data

Week 5: 11/05/17 - 11/11/17

* Project Code/Design Review [Getting more into detailed code architecture] (11/07/17)

Week 6: 11/12/17- 11/18/17

* Meet with Professor Zhi Li to review what we have done so far

Week 7: 11/19/17 - 11/25/17

* Creating a frame/agenda setting document for the Design Review (Assignment in technical Review document)
* Make sure that we add all necessary code documentation that hasn’t been added already

Week 8: 11/26/17 - 12/04/17

* Project Design Review (11/28/17): (focused on high-level design decisions) Presenting our plan for the project. This will help us with useful/actionable feedback.
* Reflection/synthesis document on Design Review ( (Assignment in technical Review document)
* Make necessary changes to our design and code
* Mid Project Presentation (11/30/2017)

Final Week:

* Presentation on the Final Demo (12/07/17)
* Code Submission with a README describing how to run the code (12/07/17)

**5. Collaboration plan:** How do you plan to collaborate with your teammates on this project? Will you split tasks up, complete them independently, and then integrate? Will you pair program the entire thing? Make sure to articulate your plan for successfully working together as a team. This might also include information about any software development methodologies you plan to use (e.g. agile development). Make sure to make clear why you are choosing this particular organizational Structure.

We will be working together for most of the project with pair programming. We will schedule a couple meetings per week to code and work on the project. There will be an agenda for each meeting and goals set for each meeting. We will be able to hold each other accountable. The software development methodology we plan to use is Scrum Methodology. We will be discussing the progress, upcoming work, and obstacles that are raised. We will be working in series of short sprints once every week. After the sprints, we will reevaluate our progress and set new goals for the next sprint. This will encourage verbal communication and open discussion throughout the progression of the project.

**6. Risks:** What do you view as the biggest risks to the success of this project?

The biggest risks to the success of this project is being able to create an effective linear regression function that will actually create a bid that is an accurate predictor of the lowest bid. If we are not able to create an effective algorithm, we won’t be able to generate an accurate bid. If this is the case, then we will create a more simplistic algorithm to integrate into our code.

The other risk we have would have to do with the historical data not providing the essential data we need to create the algorithm. If we were to run into this, we would have the founder of MainStreeter, who is on our team, reach out to the necessary people to collect the necessary data with hopes of getting access to the requested data in time.

**7. Additional Course Content:** What are some topics that we might cover in class that you think would be especially helpful for your project?

From what we learned in class we will be utilizing a lot of functions, many different variables and expressions, and many algorithms as well. Within this, we will be using many different if, else statements and loops. We will be drawing upon excel spreadsheets to use historical data with a screen scraping approach which we will hopefully learn in class. We will also be using a lot of different API’s throughout our project which will also be helpful to learn about in class. The data analytics section will also definitely help us in mastering our approach and strategies we use for our linear regression and how we call upon historical data to make predictions. Finally, we hope to learn how to integrate our python code into HTML and CSS in a website that is facing the user and easy to use.