Our GUI project was an interesting challenge, and we had to put our best effort forth to finish the project. Finals week was closing in on us and our engineering schedules had us swamped, so our time was becoming valuable and scarce. Nevertheless, we prevailed. My partner and I met in chemistry class, and we bonded over our hatred of chem and our love of agriculture. This is where the idea for our project stemmed from (ahh, puns) and we got underway. We decided to work off the default set of ideas with our own data and code, as both of us are inexperienced in coding and coming up with a more fancy or complicated idea just wasn’t in the cards for us.

We decided to base our project on average yields (bushels/acre) of corn, soybeans, and milo in the state of Nebraska from 2010-2020. After checking with LA Laurel Hilger, our project was approved. We knew going into the project that as farming techniques advanced over the course of the decade, our results would differ from year to year with an increasing trend in yield numbers (rainfall and storm damage are also variables in this which gave us some degree of irregularity in our data). This is why farmers aren't automatically swamped by the demand for food as the population increases. A few things we noted as recent farming innovations include the following:

* Drone application technologies, or the use of unmanned aircraft to survey crop development, apply fertilizer, precisely irrigate, assist insects in pollination, and collect data
* Driverless equipment in the form of tractors, swathers, combine harvesters, sprayers, and more that can increase precision and decrease waste. These machines can work in tandem with other autonomous equipment and free up the farmer to perform other tasks around the farm. Although they are not widespread yet, there will soon be thousands of these machines pulling air seeders, sprayers, tillage equipment and balers all across the United States
* Urban and vertical farming, which is basically maximizing efficiency in an urban or suburban setting while minimizing space, growing indoors, over railings, etc. Single family or farmers market/large garden style agriculture is a good way to organically increase food production using this technique.

(All of these are processes currently in use by farmers around the world to increase yield and promote healthy and profitable growing conditions.)

Dowsett, Barrie. *Top 5 Recent Agricultural Inventions*. 2021, www.taxcloud.ie/blog/2020/top-5-recent-agricultural-inventions.)

Our project consists of graphs showing the three different crops (corn, soybeans, and milo) and how the yields changed over the years 2010-2020. The graphs would be switched using buttons, and each crop would be represented by its graph. Then, we could include a slider to further the presentation of our information. We felt that our knowledge on the agriculture subject would aid us in the completion of the project, as well as fuel our interest in the coding part.

When we began coding the project, the in-class overview Quinn did was very helpful for helping us get a plan together. In order to understand what we were doing, we had to do a little additional research on GUIs, on which we both feel a few more days in class would be helpful. Once we got that down, the rest was trial and error, with only minor headaches after that. We shared the jobs of coding and writing, to prevent either of us from taking any kind of majority in the work. We were also able to correct each other’s mistakes easily.

The first major obstacle we encountered was our combined lack of experience coding. This issue often results in a three-hour project turning into a three-day project, and some substantial hair pulling at times when things wouldn’t work. We struggled a bit with figuring out how to apply the content of 155N to our project using real world data. After some brainstorming, we figured out that we should use buttons to change crops with one data set on each graph instead of using them to change years, which would mean having 10 buttons and three data sets on each graph. Years had to be used instead of months or other time units because the data collection doesn’t fall on any particular month (unlike if we used weather or any other kind of daily recurring information, there would be no harvest data for April, etc.) It did take a lot of time to get everything squared away for the code, but once we figured out our bearings in the whole process, the actual code wasn’t all that bad, especially with some help.

Our second issue was correlating and coding those buttons and our slider to do exactly what we wanted. When we wrote that part of the code it was getting late and we were both tired, so we got pretty frustrated when it would only show one of the graphs, and the other two didn’t work. We came back the next day and were able to find a small syntax error hidden in the code, which is what caused us seemingly endless headache in the moment. Sometimes when you’re just exhausted, problems seem way more complex than they are.

The third problem we faced was the GIT link, as both of us are still iffy on how to use it. For some reason, both of us struggled substantially on using GIT; it seems so simple watching someone else do it, but as we have found with the rest of 155N, many supposedly easy things can be overcomplicated and create headaches after class is over for the day. Since a lab is dropped and we were both having a very busy week with exams, we both decided to skip lab 11 and worry about GIT later. When it came time to learn and use it for the project, it was more challenging to wrap our heads around than we had hoped. We watched a few videos on using it and after a while it ended up being fairly straightforward.

After finishing up our final project, we can say we learned enough about coding to understand it, perhaps not write full programs without some help, but we are getting there. This assignment gave us a nice opportunity to apply our love of agriculture to our computer science class, which made it enjoyable overall. In the future, we can use MATLAB and GUIs to help us display information and present it to a group, particularly through the use of text boxes to caption our work, and buttons and sliders to help add an interactive aspect and incorporate more information into our presentations, especially with the world becoming increasingly online-based. MATLAB definitely has its place in a computerized world, even though in our agricultural fields it won’t be as useful as it might be to some other majors. The problem-solving skills we had to use this semester tested us at times, but I think we have come out the other side more equipped to deal with code in the workforce.