ProjectNotebook

June 7, 2022

1 Project Description

This project consists of multiple aspects that both team members are very interested in. As biology majors, we are very familiar with the central dogma and the processes behind how DNA is made into the proteins within our bodies. DNA is first transcribed into RNA which is then translated into an amino acid sequence. The nucleotides, the basic unit of a nucleic acid, are arranged in specific orders which are recognized as codons. A codon is a sequence of three nucleotides that codes for one specific amino acid. These specific amino acids all have a single letter abbreviation which will be utilized in our project code. Given our familiarity with these pathways from our coursework, we wanted to take these principles and design a game that could be fun for users. Our code begins by having a dictionary that contains 10 different DNA sequences. One will be randomly chosen one for the user to participate in the game with. The DNA will then be transcribed into the complementary strand of RNA. From here, the code will loop through that RNA sequence in order to tell the user which amino acids are apart of the RNA strand using their single letter abbreviations. The user then will have to unscramble the single letter abbreviations in order to come up with a random 6 letter word.

1.0.1 Team Member Names and Contributions

During this project, both team members collaborated together on nearly every aspect. During the time we had in class to focus on the project, we collaborated on Function 1. ✕✕✕ was writing the code for it and ✕✕✕ was creating the dictionaries. Later in the process, we hopped on a zoom call in order to get the rest of the code working. ✕✕✕ was working on the function that would loop through the RNA sequence and check the sequence for each codon. ✕✕✕ was working on the code for the guessing game. Overall, both team members had different focuses, but they both contributed to the final project, checking each other during the process when assistance was needed.

✕✕✕: Mainly coded the dna_to_rna and rna_to_aa. Helped code guess_the_word. He also figured out how to create the random choice and how to put the information in a new order.

✕✕✕: Created the dictionaries and the DNA strands/words and helped code the guess_the_word. Also wrote the project description and the docstrings for the code.

1.1 Playing with the Central Dogma

Run the cell below to import the necessary functions

```
[3]: from final_module import bio_game
```

1.1.1 Run the cell below to get your DNA strand!

```
[4]: bio_game.get_dna_strand()
```

Your DNA strand is: CTATCTCGATAATTAAGA

1.1.2 Transcription

Enter your DNA strand as a string into the function below to get your complementary RNA strand

```
[5]: bio_game.dna_to_rna('CTATCTCGATAATTAAGA')
```

```
[5]: 'GAUAGAGCUAUUAAUUCU'
```

1.1.3 Translation

Enter your RNA strand as a string into the function to get your list of amino acids

```
[6]: bio_game.rna_to_aa('GAUAGAGCUAUUAAUUCU')
```

```
6
['A', 'N', 'I', 'D', 'R', 'S']
```

1.1.4 It's Game Time

Run the cell below and unscramble your letters to get the correct 'protein'(word)

```
[7]: bio_game.guess_the_word()
```

```
Unscramble your RNA codon appreviations in order to guess your word: Drains
YOU GOT IT!!!! Thanks for playing!
```

1.2 Reflection

██████

I had a good time during this class. I came into it with absolutely zero knowledge on how to code or what the process would look like to learn how to do it. I didn't even expect myself to be able to learn how to do the tasks at hand because I was so nervous. But through the guidance, the assignments, and the tools to solve each coding problem, I ended up learning a lot more than I expected to! My favorite aspect of coding is having the freedom to solve the code with unique things. It is cool to me that there are multiple solutions to the same problem. It gave me the freedom to try and then try again if it didn't work, which often times, it did not work. That was one of the aspects of the final project that I liked a lot. I enjoyed having the freedom to kinda go in any direction that my team wanted to do. Being at UCSD, a lot of classes don't give room for the creativity to do whatever you want for projects or other assignments. However, it was fun to challenge the creative part of my brain and to meet that with the knowledge that I gained from this class. I enjoyed coming up with an idea and then having the skills in order to make that idea a real piece of work. Aspects of the project were hard, but overall, with teamwork and the resources we had, it ended up working out!

I was looking forward to taking this class. In these past four years of undergrad, I have been very resistant to learning how to code. I didn't see much reason to learn, especially considering I'm pursuing medicine and didn't see why coding was relevant to my future feild. However, when I was exposed to coding in BIPN 145 I realized that it was something that I could enjoy. I chose to take this class because I wanted to take one fun and engaging course during my final quarter at UCSD. Taking this class challenged me in ways that others at UCSD didn't. I had to think critically about making my code function properly, while ensuring that it was concise. I started approaching the assignments like puzzles, trying to find the right pieces, and making sure they were in the right spots.

This project challenged me to creatively use the techniques and methods we learned in class and apply them in new ways. As a new coder, it reminded me of the growth I have experienced through this course. Once being able to use the "print" function amazed me, now I can define functions, use loops and classes, preform data anlysis, and other techniques that are more complex to code something entirely new.

[ ]: