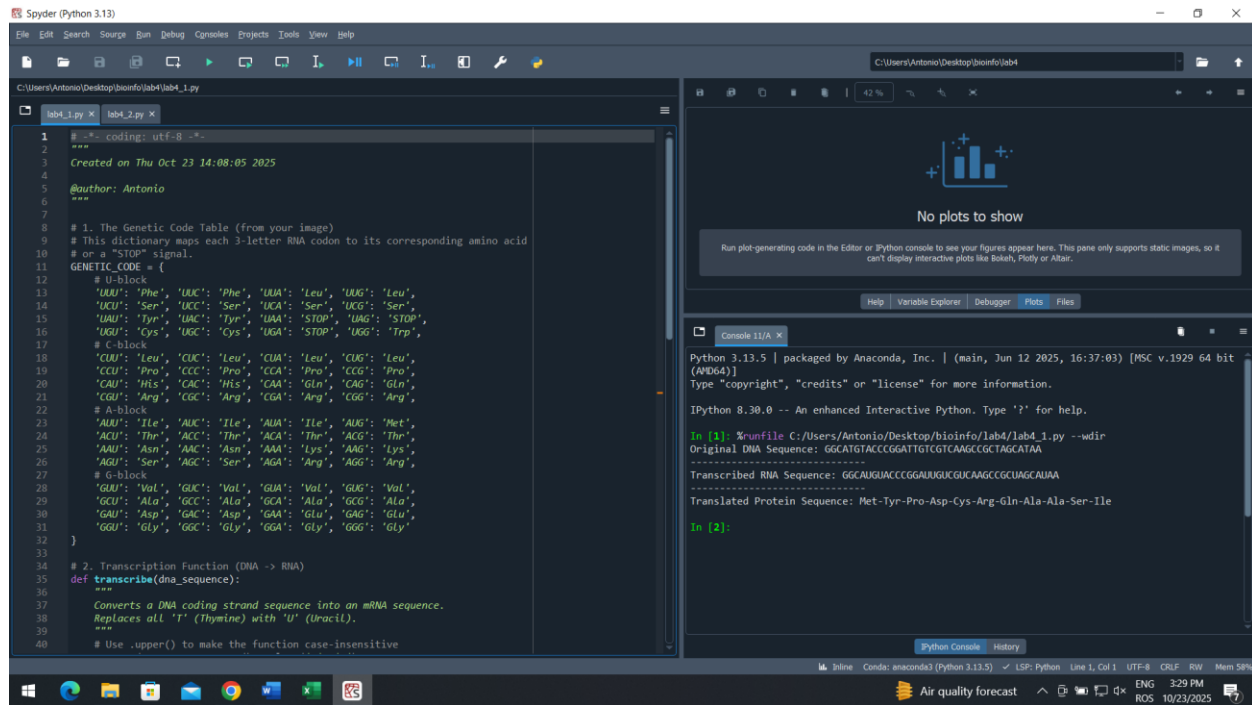


LABORATORY REPORT #4

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Bioinformatics, 4th year 1st semester, 2025-2026

lab4_1.py



The screenshot shows the Spyder Python IDE interface. The left pane displays a Python script named lab4_1.py. The script contains a genetic code table (GENETIC_CODE) and a transcription function (transcribe). The right pane shows the Python console output, which includes the execution of the transcribe function on a DNA sequence, resulting in a transcribed RNA sequence and a translated protein sequence.

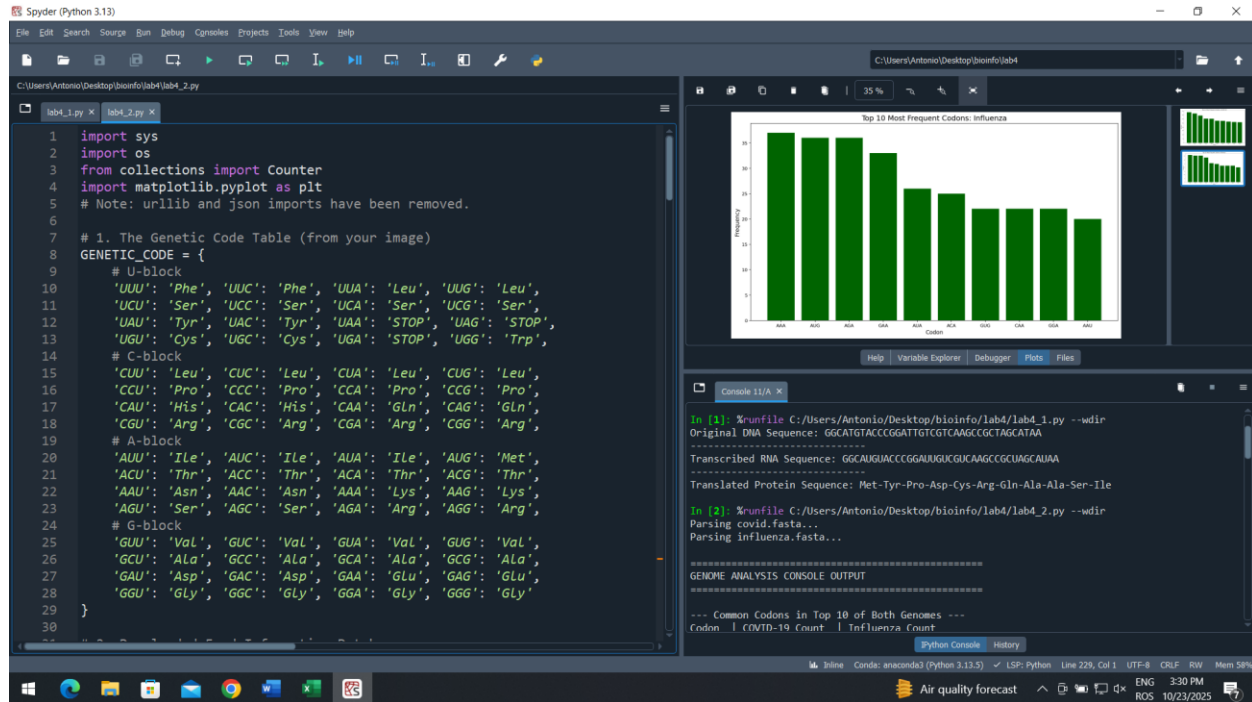
```
1 """ coding: utf-8 -*-
2
3 Created on Thu Oct 23 14:08:05 2025
4
5 @author: Antonio
6 """
7
8 # 1. The Genetic Code Table (from your image)
9 # This dictionary maps each 3-letter RNA codon to its corresponding amino acid
10 # or a "STOP" signal.
11 GENETIC_CODE = {
12     # U-block
13     'UUU': 'Phe', 'UUC': 'Phe', 'UUA': 'Leu', 'UUG': 'Leu',
14     'UCU': 'Ser', 'UCC': 'Ser', 'UCA': 'Ser', 'UCG': 'Ser',
15     'UAU': 'Tyr', 'UAC': 'Tyr', 'UAA': 'STOP', 'UAG': 'STOP',
16     'UGU': 'Cys', 'UGC': 'Cys', 'UGA': 'STOP', 'UGG': 'Trp',
17     # C-block
18     'CUU': 'Leu', 'CUC': 'Leu', 'CUA': 'Leu', 'CUG': 'Leu',
19     'CCU': 'Pro', 'CCC': 'Pro', 'CCA': 'Pro', 'CCG': 'Pro',
20     'CAU': 'His', 'CAC': 'His', 'CAA': 'Gln', 'CAG': 'Gln',
21     'CGU': 'Arg', 'CGC': 'Arg', 'CGA': 'Arg', 'CGG': 'Arg',
22     # A-block
23     'AUU': 'Ile', 'AUC': 'Ile', 'AUA': 'Ile', 'AUG': 'Met',
24     'ACU': 'Thr', 'ACC': 'Thr', 'ACA': 'Thr', 'ACG': 'Thr',
25     'AAU': 'Asn', 'AAC': 'Asn', 'AAA': 'Lys', 'AAG': 'Lys',
26     'AGU': 'Ser', 'AGC': 'Ser', 'AGA': 'Arg', 'AGG': 'Arg',
27     # G-block
28     'GUU': 'Val', 'GUC': 'Val', 'GUA': 'Val', 'GUG': 'Val',
29     'GCU': 'Ala', 'GCC': 'Ala', 'GCA': 'Ala', 'GCG': 'Ala',
30     'GAU': 'Asp', 'GAC': 'Asp', 'GAA': 'Glu', 'GAG': 'Glu',
31     'GGU': 'Gly', 'GGC': 'Gly', 'GGA': 'Gly', 'GGG': 'Gly',
32 }
33
34 # 2. Transcription function (DNA -> RNA)
35 def transcribe(dna_sequence):
36     """
37     Converts a DNA coding strand sequence into an mRNA sequence.
38     Replaces all 'T' (Thymine) with 'U' (Uracil).
39     """
40     # Use .upper() to make the function case-insensitive
```

Python 3.13.5 | packaged by Anaconda, Inc. | (main, Jun 12 2025, 16:37:03) [MSC v.1929 64 bit (AMD64)]
Type "copyright", "credits" or "license()" for more information.
IPython 8.30.0 -- An enhanced Interactive Python. Type '?' for help.
In [1]: %runfile C:/Users/Antonio/Desktop/bioinfo/lab4/lab4_1.py --wdir
Original DNA Sequence: GGCATGTACCCGGATTGTCTCAAGCCGCTAGCATAA

Transcribed RNA Sequence: GGC AUGUACCCGGAUGUGUCAAGCCGCUAGCAUAA

Translated Protein Sequence: Met-Tyr-Pro-Asp-Cys-Arg-Gln-Ala-Ala-Ser-Ile
In [2]:

lab2_2.cpp



%runfile C:/Users/Antonio/Desktop/bioinfo/lab4/lab4_2.py --wdir

Parsing covid.fasta...

Parsing influenza.fasta...

GENOME ANALYSIS CONSOLE OUTPUT

--- Common Codons in Top 10 of Both Genomes ---

Codon | COVID-19 Count | Influenza Count

AAA | 303 | 37

AGA | 277 | 36

AAU | 260 | 20

TOP 3 AMINO ACIDS (COVID-19)

1. Leu: 886 occurrences
2. Ser: 810 occurrences
3. Thr: 679 occurrences

TOP 3 AMINO ACIDS (Influenza)

1. Val: 66 occurrences
2. Arg: 64 occurrences
3. Ser: 63 occurrences

STATIC FOOD RECOMMENDATION (Pre-loaded)

The top amino acids from both genomes are: Arg, Leu, Ser, Thr, Val.

Here is a breakdown of those amino acids and a general list of foods that are low in protein (and thus low in these amino acids).

--- Notes on Top Amino Acids ---

* Arginine: A conditionally-essential amino acid. Abundant in nuts, seeds, and meats. Dairy is a source, but generally lower than nuts.

* Leucine: An essential amino acid. Found in high-protein foods (meat, dairy, soy). Some grains like corn are lower in leucine.

* Serine: A non-essential amino acid, meaning the body can produce it. It's abundant in many foods.

* Threonine: An essential amino acid. Often found in high-protein sources. Grains like wheat and rice can be lower in threonine.

* Valine: An essential amino acid. Found in high-protein foods, soy, and peanuts.

--- General Low-Protein Food Categories ---

To avoid all these amino acids, you would seek low-protein foods:

Fats and Oils (Typically protein-free):

- Olive oil, coconut oil, vegetable oils
- Butter, margarine, mayonnaise

Sugars and Simple Starches (Primarily carbohydrates):

- Table sugar, corn-starch, honey, maple syrup
- Sorbets, hard candies, jams, jellies

Certain Fruits and Vegetables (Very low in protein):

- Apples, grapes, berries
- Cucumber, celery, lettuce, bell peppers, carrots

Beverages:

- Water, coffee, tea (without milk/cream)
- Most fruit juices (apple, grape)

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Generating charts...

Please close the chart windows to exit the program.