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**Project idea: DNA-to-Protein Conversion Tool**.

The tool would allow users to input a DNA sequence, transcribe it to mRNA, and then translate the mRNA into a protein sequence. This project could include a web application where users enter DNA sequences and get the corresponding mRNA and protein outputs. Additionally, one could add features like visualizing the protein structure using libraries like **Py3Dmol** or **PyMOL** for 3D visualization. It could also include functionality for highlighting mutations or comparing multiple DNA sequences to show how changes affect the protein sequence. This project would combine bioinformatics and web development skills to create a useful tool for genetic analysis.

**Project:**

genetic\_code = {

"AUG": "M", "UUU": "F", "UUC": "F", "UUA": "L", "UUG": "L",

"CUU": "L", "CUC": "L", "CUA": "L", "CUG": "L", "AUU": "I",

"AUC": "I", "AUA": "I", "GUU": "V", "GUC": "V", "GUA": "V",

"GUG": "V", "UCU": "S", "UCC": "S", "UCA": "S", "UCG": "S",

"CCU": "P", "CCC": "P", "CCA": "P", "CCG": "P", "ACU": "T",

"ACC": "T", "ACA": "T", "ACG": "T", "GCU": "A", "GCC": "A",

"GCA": "A", "GCG": "A", "UAU": "Y", "UAC": "Y", "UAA": "\*",

"UAG": "\*", "CAU": "H", "CAC": "H", "CAA": "Q", "CAG": "Q",

"AAU": "N", "AAC": "N", "AAA": "K", "AAG": "K", "GAU": "D",

"GAC": "D", "GAA": "E", "GAG": "E", "UGU": "C", "UGC": "C",

"UGA": "\*", "UGG": "W", "CGU": "R", "CGC": "R", "CGA": "R",

"CGG": "R", "AGU": "S", "AGC": "S", "AGA": "R", "AGG": "R",

"GGU": "G", "GGC": "G", "GGA": "G", "GGG": "G"

}

def transcribe\_dna\_to\_mrna(dna\_sequence):

return dna\_sequence.replace("T", "U")

def translate\_mrna\_to\_protein(mrna\_sequence):

protein = []

for i in range(0, len(mrna\_sequence), 3):

codon = mrna\_sequence[i:i+3]

amino\_acid = genetic\_code.get(codon, "")

if amino\_acid == "\*": # Stop codon

break

if amino\_acid:

protein.append(amino\_acid)

return "".join(protein)

dna\_sequence = input("Enter a DNA sequence: ").upper()

mrna\_sequence = transcribe\_dna\_to\_mrna(dna\_sequence)

print("mRNA Sequence:", mrna\_sequence)

protein\_sequence = translate\_mrna\_to\_protein(mrna\_sequence)

print("Protein Sequence:", protein\_sequence)

**Input/output:**

