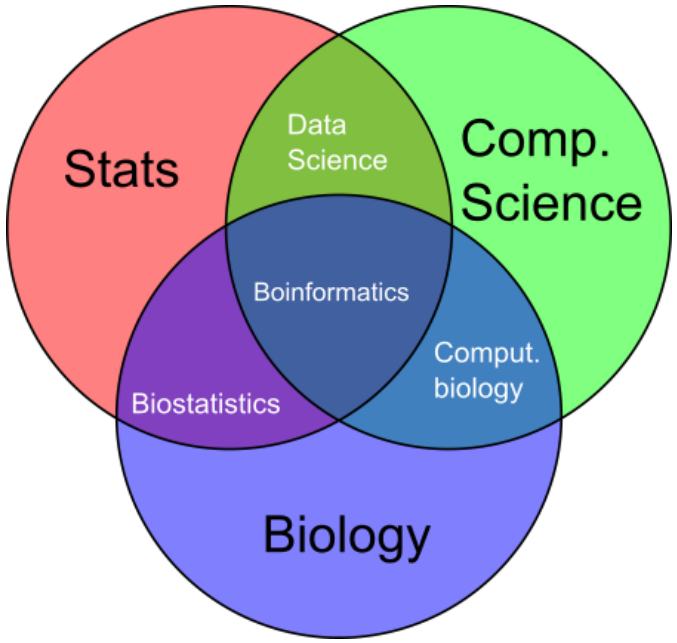
Intro to Bioinformatics

App: DNA Sequence Analyzer GUI

What is Bioinformatics

- Bioinformatics is an interdisciplinary field that combines biology, computer science, and statistics to analyze and interpret biological data



Why this topic

- Angela already knows about a lot of python stuff.
- Our target is to make a DNA Sequence Analyzer GUI application.
- Steps are in next slides

Step 1: structure

- dna_analyzer/
- │
- ├── main.py # Main entry point for the app
- ├── dna_utils.py # DNA utility functions (GC content, reverse complement, transcription)
- └── gui.py # PyQt5 GUI logic and design

Step 2: Code for Each File

- dna_utils.py
- def calculate_gc_content(dna):
- return (dna.count("G") + dna.count("C")) / len(dna) * 100

- def get_reverse_complement(dna):
- complement = {'A': 'T', 'T': 'A', 'C': 'G', 'G': 'C'}
- return "".join(complement[base] for base in reversed(dna))

- def transcribe_dna_to_rna(dna):
- return dna.replace("T", "U")

gui.py

- from PyQt5.QtWidgets import QWidget, QVBoxLayout, QLabel, QLineEdit, QPushButton, QMessageBox

- from dna_utils import calculate_gc_content, get_reverse_complement, transcribe_dna_to_rna

- class DNAAnalyzer(QWidget):
  - def __init__(self):
  - def initUI(self):
  - def analyze_sequence(self):

main.py

- import sys
- from PyQt5.QtWidgets import QApplication
- from gui import DNAAnalyzer

- if __name__ == '__main__':
- app = QApplication(sys.argv)
- analyzer = DNAAnalyzer()
- analyzer.show()
- sys.exit(app.exec_())