Beyond the Code: Embedding Social and Civic Responsibility in Introduction to Computer Science

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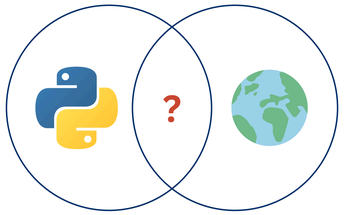
Problem

- Introduction to Computer Science courses focus on technical mastery and often feel disconnected from the real-world.
- This disconnect makes it difficult to address social and civic responsibility.



Proposal

- **Goal**: Teach Python programming fundamentals in a way that encourages discussion and practice of social and civic responsibility.
- **How**: Design assignments and in-class activities that teach technical concepts through real-world examples, each emphasizing one or more of the critical ideas: "computing has limits", "data has limits", and "CS has responsibility".

Data Assignment: Health Records

Students analyze synthetic patient health records:

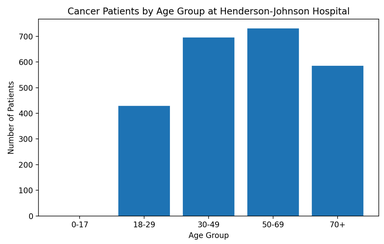
- Part 1: Access the Data

```
print(names[0], ages[0],
genders[0],
blood_types[0],
medical_conditions[0]...)
```

- Part 2: Analyze the Data

```
Hospital Distribution:
Northview Medical: 18.02%
Riverside Clinic: 12.61%
...
```

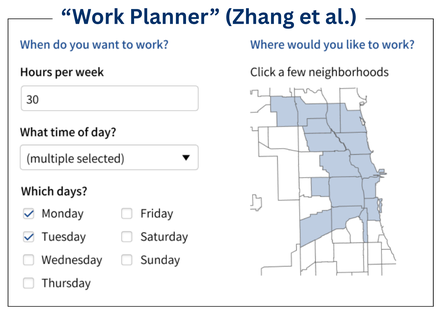
- Part 3: Visualize the Data



Basics Assignment: Work Planner

Students create a tool for delivery drivers to calculate their expected income, also reflecting on:

- How technology influences work.
- What variables affect income.
- Harms faced by gig workers under algorithmic control.
- Proposed solutions.



In a Human Rights Watch survey of 127 platform workers in Texas, 70% were fearful of being suspended or deactivated by the app's algorithm.

Functions Assignment: Online Shopping

Students implement functions that power an online shopping simulator:

- `apply_purchase`
- `offer_product`
- `create_payment_plan`
- `apply_payment_plans`
- `apply_discount`

```
Welcome to the Shopping
Simulator!

Product Offer
Offer: Echo Dot (5th Gen 2022
release) in Electronics
Price: $49.99
Your current balance: $134.80
```

Throughout, they reflect on:

- The importance of accuracy in transaction logic.
- Predatory design practices of each function, as reflected in real-world shopping platforms.

In-class Activities

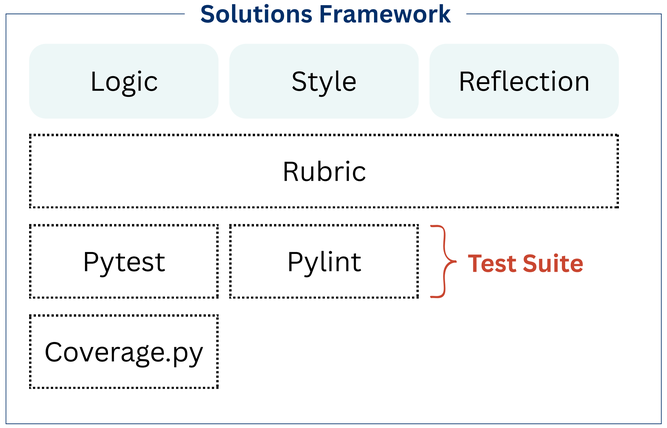
- In-class activities introduce technical concepts related to working with datasets in Python.
- The materials use U.S. COVID-19 data.
- Students reflect on the limitations of data and how visualization choices can influence interpretation.

	Lecture	Activity
Day 1	Access and explore the data	Worksheet
Day 2 *half day*	Explore the data and perform statistical analysis	Lab
Day 2 & 3	Use libraries and documentation to create data visualizations	Gallery walk

Limitations of Data

Data Interpretation

Solutions



- **Pytest** tests check student functions for correct behavior.

```
test_empty_functions PASSED              [  7%]
test_offer_product_keys PASSED           [ 14%]
test_offer_product_valid_row PASSED      [ 21%]
test_offer_product_randomness PASSED     [ 28%]
```

- **Coverage.py** measures how thoroughly tests cover the code.

Coverage for: **shopping_simulator.py**: 100%
35 statements | 35 run | 0 missing

- **Pylint** checks code style based on predetermined standards.

```
shopping_simulator.py:94:0: C0301:
Line too long (87/80) (line-too-long)
```