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

Jamal Omosun, Teammates: Chloe Simanek, Ryan Choi, Ava Amthaeur, Advisor: Jean Salac

Introduction

Why Ethics in CS?

- Algorithms influence decisions about loans, labor, and consumption.
- CS students must recognize that technical choices = moral choices.

Goal: Embed ethical reflection within existing technical assignments.

Approach: Align fundamental programming topics with ethical case considerations::gig economy, loan approval, healthcare, and consumerism

Purpose

- To integrate ethical reflection alongside technical mastery.
- To demonstrate that algorithmic design choices have real social effects.
- To measure whether students began recognizing biases and assumptions in their code.
- To develop a scalable model for embedding ethics into CS foundations.

Conditionals and Loops Write-Up

- *Technical Concepts:* if/else, for, while.
- *Context:* Financial systems — loan approvals and credit score algorithms.
- *Activity:* Simulate loan approval using conditional logic.
- *Ethical Focus:* Threshold decisions reflect bias and assumptions about users.

Functions Assignment Code

- *Technical Concepts:* functions, nested calls, data generation.
- *Context:* Consumerism and addictive shopping algorithms.
- *Activity:* Implement purchase/refund functions using synthetic shopping data.
- *Ethical Focus:* Design features can encourage overspending or promote responsible use.

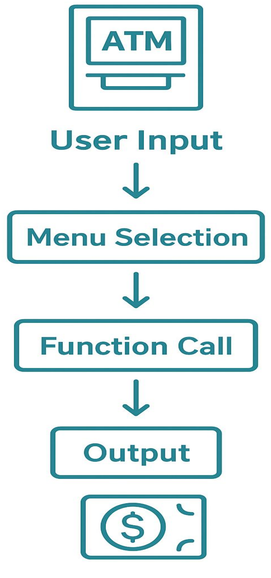
Basics Testing Suite

- *Technical Concepts:* data types, operators, print/input, refactoring, PyLint, Pytest
- *Context:* Gig economy and worker fairness.
- *Activity:* Create “Work Planner” calculating projected income from pay × hours.
- *Ethical Focus:* Automation can empower or exploit workers — testing ensures accountable design.

In Class Assignment

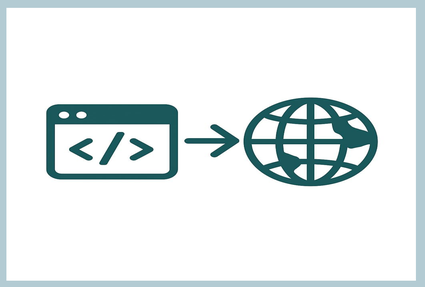
TImeline Overview

- **Day 1:** Intro to functions + live demo walkthrough
- **Day 2:** Students design and test their ATM programs in teams
- **Day 3**: Students work on improving their ATM programs design with ethical considerations
- Understand how to define and call functions in Python
- Practice code modularization and logical flow between functions
- Model real-world systems to motivate ideas behind programs
- Reflect on the ethical implications of code that handles sensitive data



Conclusion

- Embedding ethics within technical labs deepens student learning.
- Students gain both computational and civic reasoning skills.
- Future Work: expand to more courses and measure long-term learning outcomes.



Further Research

- Expand approach to more class
- Expand out of Carleton system
- Use structure and ethical framework to desgin an entire class
- Test ideas on an actual Introduction to Computer Science (CS 111) class

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Department of Computer Science, Carleton College