KHÓA HỌC: Problem Solving Using Computational Thinking

by University of Michigan

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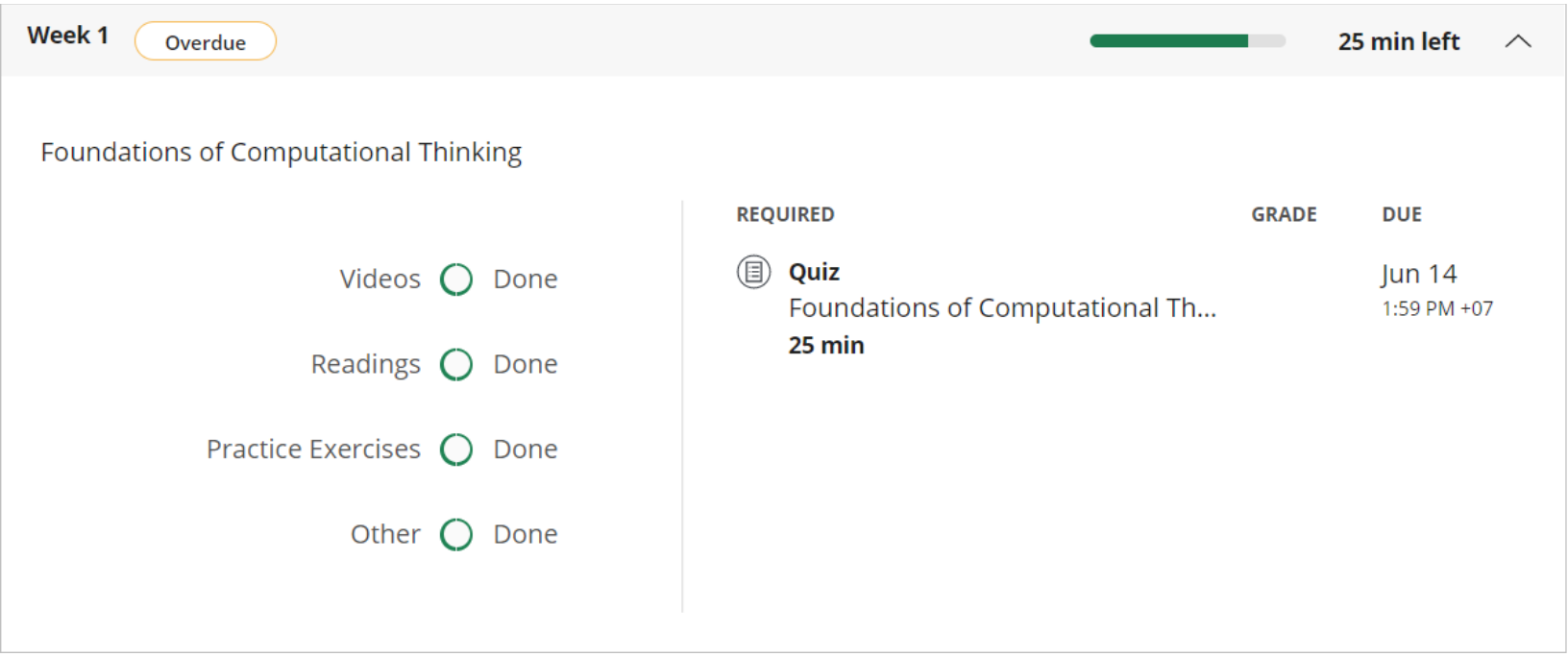
WEEK 1



Foundations of Computational Thinking Quiz

TOTAL POINTS 6

1. In computational thinking terms, breaking down a complex problem into smaller, more specific sub-problems is called _____. 1 point

- ○ Problem Identification
- ○ Pattern Recognition
- ◉ Decomposition

2. True or False: Computational thinking techniques can help programmers conceptualize problems before they begin programming. 1 point

- ◉ True
- ○ False

3. In computational thinking terms, framing a problem and determining if it can be solved by computers is known as _____. 1 point

- ○ Pattern Recognition
- ◉ Problem Identification
- ○ Abstraction

4. While writing a program for building a cake, you decide that some information is less relevant for your particular program. For instance, you might decide that you **don't** need to know the flavor of ice cream that the cake is being served with, and you **don't** need to know what color plates the cake is being served on. In computational thinking terms, this process of ignoring or filtering out less relevant information is known as _____. 1 point

- ◉ Abstraction
- ○ Pattern Recognition
- ○ Decomposition

5. True or False: When identifying a problem for a computer to solve, it is best to identify problems that are subjective or open-ended. 1 point

- (●) True
- ( ) False

6. True or False: Computational thinking is a linear process. 1 point

- ( ) True
- (●) False

WEEK 2

Week 2 — **20 min left**

Case Study: Airport Surveillance and Image Analysis

Videos	Done
Readings	Done
Practice Exercises	Done
Other	Done

REQUIRED	GRADE	DUE
Quiz Airport Surveillance Case-Study Q... **20 min**		Jun 21 1:59 PM +07

Airport Surveillance Case-Study Quiz

TOTAL POINTS 5

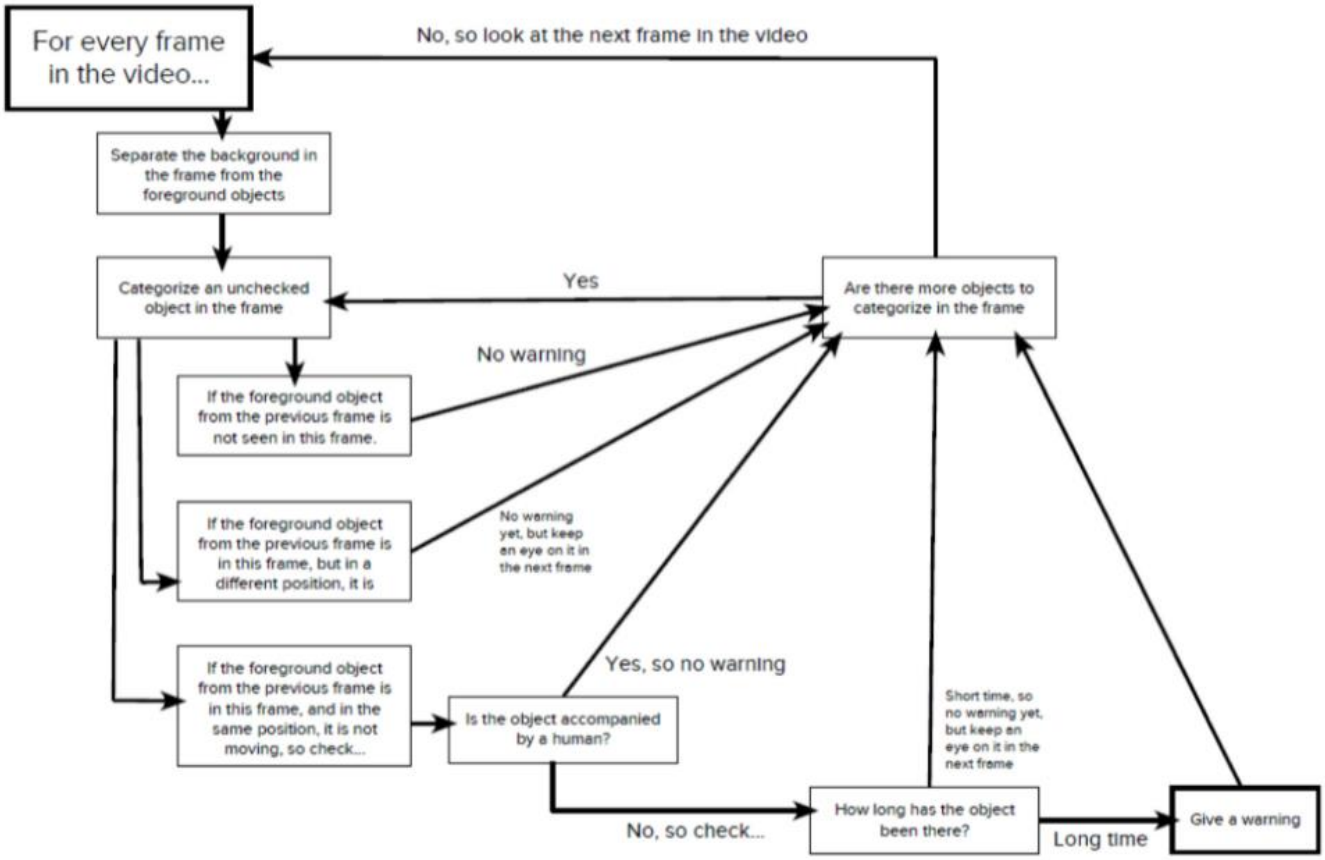
1. Identifying suspicious behavior at an airport is a complex problem. In this case study, what was one strategy for decomposing this problem into a smaller, more manageable problem? 1 point

- [ ] Design an algorithm that can differentiate between airport staff and travelers.
- [ ] Define a specific type of suspicious behavior in quantifiable terms.
- [ ] Use machine learning to track which parts of the airport is the busiest.
- [x] Design an algorithm that counts how often luggage is left unattended.

2. When designing an algorithm that will detect unattended luggage, what kind of information would likely **NOT** be relevant to this problem? 1 point

- [ ] Whether a piece of luggage is idle or moving.
- [ ] The distance between attended luggage and its owner.
- [ ] The length of time luggage has been left unattended.
- [x] The types of clothing people in an airport are wearing.

3. Using the following algorithm, what would happen if the luggage in one video frame is **not** seen in the next frame? 1 point



- (●) The algorithm generates a warning.
- ( ) The algorithm checks to see if the luggage is accompanied by a human.
- ( ) No warning is given, and the algorithm checks if there are more objects to categorize in the frame.
- ( ) The algorithm checks to see how long the luggage has been moving.

4. Since computer-based solutions require questions that are specific and quantifiable, which one of the following questions is **most** appropriate for a computer-based solution? 1 point

- Why is flying better than driving a car?
- How many people have entered the airport in the past two hours?
- What kind of luggage is the most aesthetically pleasing?
- What kind of behavior is suspicious?

5. What is an algorithm? Choose the best answer: 1 point

- The process of identifying patterns that can lead you to a potential solution.
- A process or defined set of rules used by a computer for solving an identified problem.
- The process of identifying parts of a problem that can be ignored when approaching a problem.
- The breaking down of a large, complex problem, into smaller more manageable problem.

WEEK 3

Week 3 20 min left

Case Study: Epidemiology

Videos Done

Readings Done

Practice Exercises Done

Other Done

REQUIRED	GRADE	DUE
Quiz Epidemiology Case-Study Quiz **20 min**		Jun 28 1:59 PM +07

Epidemiology Case-Study Quiz

TOTAL POINTS 5

1. In the epidemiology case study, we constructed the following algorithm: 1 point

In this algorithm, *S* represents the number of people susceptible to infection, *b* represents the rate of infection, *I* represents the number of people infected, *r* represents the recovery rate, and *R* represents the number of people who have recovered from infection.

Using this algorithm, what changes would we expect if **more** people washed their hands and covered their coughs during flu season?

- ○ The number of infected people (*I*) would increase, which would result in more recovered people (*R*).
- ○ The recovery rate (*r*) would decrease, resulting in more recovered people (*R*).
- ◉ The rate of infection (*b*) would decrease, which would result in less infected people (*I*).
- ○ The number of susceptible people (*S*) would increase, which would result in an increased number of infected people (*I*).

2. In the epidemiology case study, the *SIR* model accounted for the number of people susceptible to infection, the rate of infection, the number of people infected, the rate of recovery, and the number of people who recovered from the infection. If we wanted to create a more accurate model for predicting the spread of the flu, what information would be **most** relevant for this problem? 1 point

- (●) The migration patterns of infected people.
- ( ) The amount of electricity people use in their homes.
- ( ) The dental records of susceptible people in a given location.
- ( ) The number of cell phone calls recovered people make in a day.

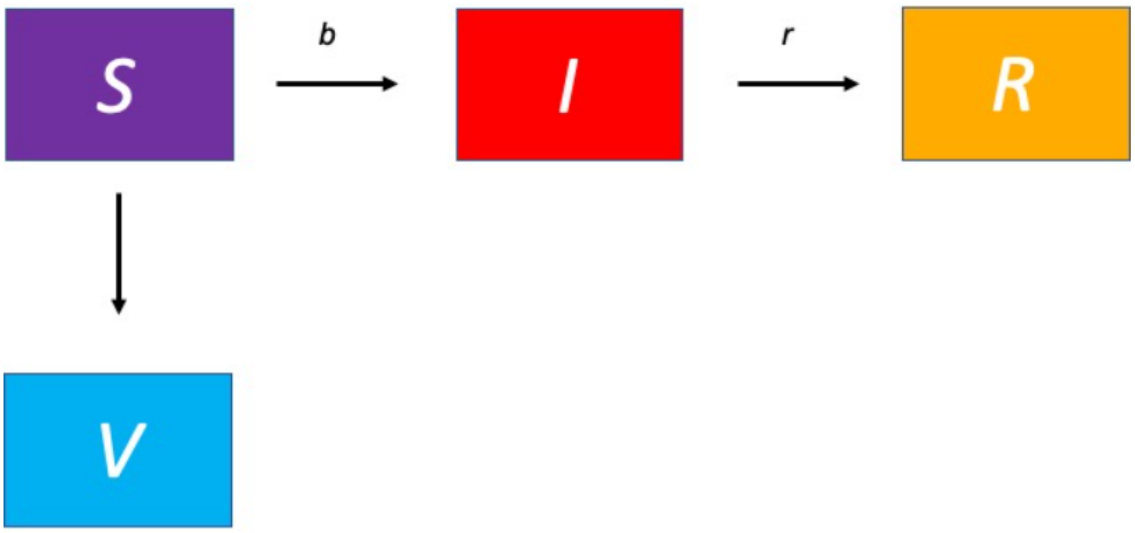
3. Predicting the number of people who will become infected with the seasonal flu can be a complex problem. In computational thinking terms, describing this complex problem in such a way so that it can be solved by a computer is known as _____. 1 point

- ( ) Evaluation
- ( ) Abstraction
- ( ) Pattern Recognition
- (●) Problem Identification

4. In the epidemiology case study, the *SIR* model utilized the following information: the number of people susceptible to infection (*S*), the rate of infection (*b*), the number of people infected (*I*), the recovery rate (*r*), and the number of people who recovered from infection (*R*). This process of focusing on relevant information and ignoring less relevant information represents what computational thinking technique? 1 point

- ( ) Abstraction
- (●) Decomposition
- ( ) Problem Identification

5. In the epidemiology case study, we expanded on the original *SIR* model by adding information about vaccinations. The expanded model looked like this: 1 point

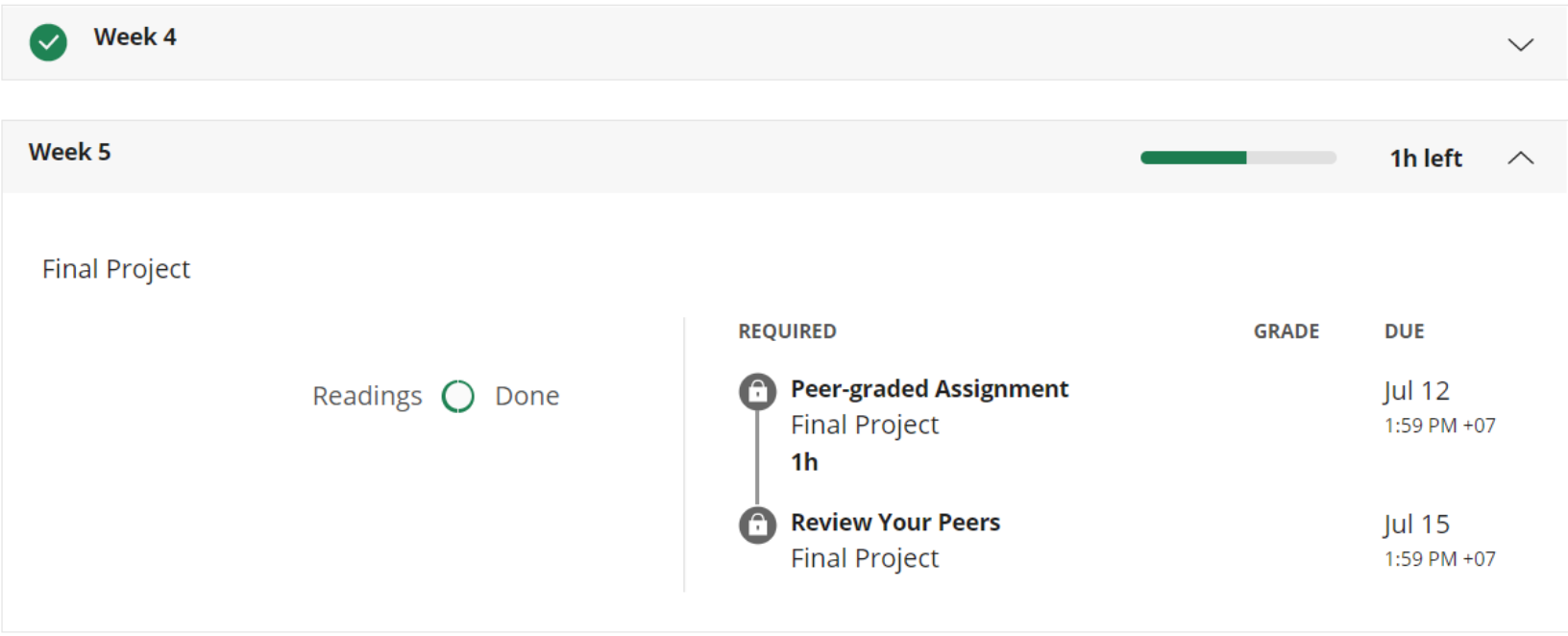


In this expanded model, the number of vaccinations (*V*) decreases the number of people who are susceptible to infection (*S*).

Using this algorithm, what will happen to the number of people recovered (*R*) at the end of an epidemic if we increase *V* at the beginning?

- ○ The number of people recovered (*R*) will decrease.
- ○ The number of people recovered (*R*) will increase.
- ◉ The number of people recovered (*R*) will stay the same.

WEEK 4 + 5


Week 4
Week 5
1h left
Final Project
Readings
Done
REQUIRED
GRADE
DUE
Peer-graded Assignment
Final Project
1h
Jul 12
1:59 PM +07
Review Your Peers
Final Project
Jul 15
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