LEC 16

CSE 121

Array Patterns

BEFORE WE START

Talk to your neighbors:

How was your long weekend?

Music: 🌻 CSE 121 26sp Lecture Tunes 🌻

Instructors: Matt Wang

TAs:

Abdul	Amogh	Anant	Anum	Cayden
Dalton	Ethan	Hayden	Jesse	Jessica
Johnathan	Minh	Navya	Paul	Reese
Ruslana	Sam	Savannah	Spencer	Shayna
Tamsyn	TJ	Trey		

Questions during Class?

Raise hand or send here

sli.do #cse121

Announcements, Reminders

- Quiz 2 in section **tomorrow (Thursday, May 28th)**!
  - Reference sheet and practice quizzes (+ keys) on Ed
  - Email Matt before our quiz section if you need to request a makeup
- P3 will be released tonight & due **Tuesday, June 2nd**
- R5 due tomorrow (eligible: **P1**, C2, P2)
  - P1 cycling out of eligibility after R5
- Final Exam on **Wednesday, June 10th at 2:30 – 4:20 PM** (in this room!)
  - Left-handed desk request form out now, due **Tuesday, June 2nd**
  - More details posted soon, and will be discussed on Friday

Closing the Loop: P2 Reflections (Bias!)

Clear consensus on *potential* for bias (related to the video!)

- "classic" social issues: insurance & zip code
  (proxies for wealth, socioeconomic status, geography, and race)
- domain-specific biases:
  - not all medical conditions are temperature or pain-based!
  - systemic *underreporting* in reported pain levels
    (particularly across cultures, gender, and chronic illness)

(and many more!)

P2 Reflection Excerpt: Pain Tolerance

"Another Bias that could happen is varying pain tolerances. I have a very high pain tolerance. When my appendix completely ruptured when I was 9 years old, I wasn't in that much pain, while my body was in danger of developing sepsis."

Closing the Loop: P2 Reflections (Fixes?)

Less clear consensus on how to *fix* potential bias.

- many suggested removing zip code and/or insurance
  - some *instead* suggest using zip code to correct for inequity (e.g. prioritizing patients who don't live close to hospitals)
  - others noted practical reasons why you might need these
- many suggested collecting more data
  - most common: medical history, other vitals, wait time
  - but, little agreement on *what* to add (and how to weight them)!
  - should we consider factors like disability? gender? race?

Closing the Loop: P2 Reflections (So What?)

Three takeaways:

1. Technology is not neutral: it is made by people (and their biases)!
2. Solving these issues is **hard**! Often no "obviously correct" answer.
3. *First* step is to start thinking (reflection!) – but far from the last!

Will you have to make a patient prioritization algorithm in your job?

Honestly, maybe! (hospitals are one of the *largest* employers: UW Medicine employs 35,000 people)

Will you make "data-driven" decisions in the future? **Absolutely.**

P2 Reflection Excerpt: Real-Life P2!

I recently visited a medical center for a routine procedure and the nurse treating me mentioned that they had recently implemented a new scheduling system that schedules and assigns patients to rooms and providers. The nurse had said to me that the system fails to consider human error such as a patient showing up late, or two patients being in one room when they aren't a good fit to be together

…

There are still many flaws that show up in a system that seems so simple, which my nurse mentioned had been throwing everyone off all day.

(PCM) Why Discuss Array Patterns?

- Arrays are important! This is our fourth lecture covering arrays
- Analogy: tools in toolbox
- Helpful for your future in programming

(PCM) Counting Elements that Meet a Condition

"one"	"two"	"three"	"six"	"seven"	"eight"	"ten"

```
public static int evenLength(String[] list) {
    int countEven = 0;
    for (int i = 0; i < list.length; i++) {
        if (                              ) {
            countEven++;
        }
    }

    return countEven;
}
```

(PCM) Modifying Elements of an Array

4	8	15	16	23	42

```
public static void clamp(int min, int max, int[] list) {
    for (int i = 0; i < list.length; i++) {
        if (         > max) {
                     = max;
        } else if (         < min) {
                     = min;
        }
    }
}
```

(PCM) Searching for an Element

"one"	"two"	"three"	"six"	"seven"	"eight"	"ten"

```
public static int indexOfIgnoreCase(String phrase, String[] list) {
    for (int i = 0; i < list.length; i++) {
        if (                                    ) {
            return i;
        }
    }

    return -1;
}
```

(PCM) Shifting Elements

9.6	-88.0	4.815	0.009	7.0184	42.9

```
public static void rotateRight(double[] list) {
    double lastElement = list[list.length - 1];

    for (int i = list.length - 1; i > 0; i--) {
        list[i] = list[i - 1];
    }

                          ;

}
```

(PCM) Analyzing Multiple Elements in an Array (isPalindrome)

0	1	9	1	0

```
public static boolean isPalindrome(int[] list) {
    for (int i = 0; i < list.length / 2; i++) {
        if (list[i] != list[list.length - 1 - i]) {
            return      ;
        }
    }

    return     ;
}
```

(PCM) Analyzing Multiple Elements in an Array (isMirrored)

4.1	5.5	4.1
6.0	-1.1	6.0

```
public static boolean isMirrored(double[][] arr) {
    for (int i = 0; i < arr.length; i++) {
        int rowLength =                         ;
        for (int j = 0; j <                       ; j++) {
            if (arr[i][j] != arr[i][rowLength - 1 - j]) {
                return                ;
            }
        }
    }
    return                        ;
}
```

(PCM) Array of Counters

0	1	2	2	0	2

```
public static int[] numCount(Scanner input, int numPrompts) {
    int[] counts =                ;
    for (int i = 0; i < numPrompts; i++) {
        int num = input.nextInt();

                        ;

    }

    return counts;
}
```

(PCM) Your Turn!

- Review the problems in the Array Patterns PCM
  - On Slido, vote for any problems you would like to go over together!
- If you have time, try some new problems!
  - [NEW] rotateLeft: Shifting Elements problem
  - [NEW] isAllPairs: Analyzing Multiple Elements problem
  - [NEW] transpose: 2D Analyzing Multiple Elements/Shifting Elements problem

(PCM) Questions to Ask Ourselves

- "Are we looking at each element in the array, one at a time?"
  - Loop traversal

- "Are we changing elements in the array?"
  - Update the array at a specific index

- "Do we only want to do a task if a certain condition is true?"
  - Conditional(s)

rotateLeft

0.1	0.2	0.3	0.4	0.5

isAllPairs

3	3	4	4	5	5	6	6	7	7

-1	-1	0	0	4	8	8	9	10	10

transpose

1	2	3
4	5	6
7	8	9