CS 314: Data Structures

First Discussion Section! - Spring 2022

Sam’s Section

Slides I make this semester will be available on my website: cs.utexas.edu/~slaberge
Zoom Logistics

- Please turn your cameras on if possible
- Enter & leave breakout rooms quickly!
- If you have a question, just unmute yourself and ask or type it in chat
  - If this becomes too chaotic, we can switch to raising hands
Help Hours
(formerly Lab Hours)

• You can go to any TA’s (or Mike’s) help hours
  • Mine are Monday 6-8pm, Tuesday 4-5pm (Zoom), Thursday 4-6pm
  • If you have questions you think only I can answer (e.g. my style preferences) and can’t make my help hours, contact me!

• The line will get quite long later in the semester, so start assignments early!

• Sign up link for Zoom help hours: cs314.utcshelphours.com

• In-person help hours are in the 3rd floor lab in GDC

If you have no idea why we seem obsessed with ducks, see: Rubber Duck Debugging (but also cuz they’re cute)
About Me

Samuel Laberge

- Senior in CS at UT
- Took CS312 in Fall ’18 and CS314 in Spring ‘19
- TA’d for 314 Fall ’19, Spring ’20, Fall ’20, Spring ’21, Fall ’21
- Interned at WP Engine (2020) and Stripe (2021)
- Currently in the five-year MS program
- Feel free to ask about anything UT, CS, or internship related!
How to Contact Me

• For questions about assignments, exams, and class logistics, please use Piazza.
• For more personal questions, like grades, please message me through Canvas.
  • I should respond within 24 hours, if I don’t follow-up with me
Time to choose a Section Name!

https://tinyurl.com/ykzufrkw
Code Camp Common Mistakes

Assignment Discussion

• Be wary of repeated/redundant code!
  
  • If you ever notice that you’re writing very similar code more than once, it may be redundant. Try to find a way to generalize it (TAs can help with this in Help Hours)

• Formatting:
  
  • Every method should have a comment above it describing what it does, any preconditions, and ideally a description of parameters it expects
  
  • Keep lines under ~100 columns wide
  
  • Methods should be under ~25 lines
Code Camp Common Mistakes

Assignment Discussion

• Be wary of repeated/redundant code!
  • If you ever notice that you’re writing very similar code more than once, it may be redundant. Try to find a way to generalize it (TAs can help with this in Help Hours)

• Formatting:
  • Every method should have a comment above it describing what it does, any preconditions, and ideally a description of parameters it expects
  • Keep lines under ~100 columns wide
  • Methods should be under ~25 lines
queensAreSafe()

All Eight Directions?
`queensAreSafe()`

All Eight Directions?

We’ve already checked the red tiles for queens!
queensAreSafe()  
Generalized Direction Checks

```
[r][c]  
[r+1][c-1]  [r+1][c]  [r+1][c+1]
```
queensAreSafe()

- Redundant code for checking the different directions
- We can generalize checking a direction into a helper method
Assignment 2: MathMatrix
MathMatrix

• W.r.t. Style:
  • Make instance variables private
  • Use an auto-formatter!
  • Watch out for unnecessary repeated computations inside of loops

• W.r.t Experiments:
  • Answer all the questions!
  • It’s ok if your timing data doesn’t support your Big O analysis of a method! Remember, Big O is a big simplification!
MathMatrix
Matrix Multiplication “Review”

These two need to be the same! (precondition)

These two are your resulting matrix size:
Matrix Multiplication “Review”

\[
\begin{array}{ccc}
  a & b & c \\
  d & e & f \\
  g & h & i \\
\end{array}
\times
\begin{array}{cc}
  j & k \\
  m & n \\
  p & q \\
\end{array}
\]

\[= \]

\[
\begin{array}{c}
  aj + bm + cp \\
\end{array}
\]
**MathMatrix**
Matrix Multiplication “Review”

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>d</td>
<td>e</td>
<td>f</td>
<td></td>
</tr>
<tr>
<td>g</td>
<td>h</td>
<td>i</td>
<td></td>
</tr>
</tbody>
</table>

\[ \begin{array}{ccc}
  a & b & c \\
  d & e & f \\
  g & h & i \\
\end{array} \times \begin{array}{cc}
  j & k \\
  m & n \\
  p & q \\
\end{array} = \begin{array}{cc}
  aj + bm + cp & ak + bn + cq \\
  \qquad & \qquad \\
\end{array} \]
MathMatrix
Matrix Multiplication “Review”

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>d</td>
<td>e</td>
<td>f</td>
</tr>
<tr>
<td>g</td>
<td>h</td>
<td>i</td>
</tr>
</tbody>
</table>

\[
\begin{bmatrix}
a & b & c \\
d & e & f \\
g & h & i \\
\end{bmatrix}
\begin{bmatrix}
j & k \\
m & n \\
p & q \\
\end{bmatrix}
= 
\begin{bmatrix}
aj + bm + cp \\
dj + em + fp \\
\end{bmatrix}
\]

\[
\begin{bmatrix}
aj + bm + cp \\
ak + bn + cq \\
\end{bmatrix}
\]
Matrix Multiplication “Review”

\[
\begin{bmatrix}
a & b & c \\
d & e & f \\
g & h & i \\
\end{bmatrix}
\times
\begin{bmatrix}
j & k \\
m & n \\
p & q \\
\end{bmatrix}
= 
\begin{bmatrix}
aj + bm + cp & ak + bn + cq \\
dj + em + fp & dk + en + fq \\
\end{bmatrix}
\]
**MathMatrix**

Matrix Multiplication “Review”

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>d</td>
<td>e</td>
<td>f</td>
<td></td>
</tr>
<tr>
<td>g</td>
<td>h</td>
<td>i</td>
<td></td>
</tr>
</tbody>
</table>

\[ \begin{array}{ccc}
  & j & k \\
  & m & n \\
  & p & q \\
\end{array} \]

\[ \begin{array}{c}
  aj + bm + cp \\
  dj + em + fp \\
  gj + hm + ip \\
\end{array} = \begin{array}{c}
  ak + bn + cq \\
  dk + en + fq \\
  gk + hn + iq \\
\end{array} \]

And so on… =