Administrative notes
February 6, 2018

• Reminder: Reading quizzes due tomorrow
• Reminder: Group sign up due on Canvas tomorrow
• Reminder: You must pass the project to pass the course
• Pre-survey marks posted on Canvas
• Check Canvas for instructions on how to access your graded midterm
• Sample diversity questions posted
Midterm 1 Results

Graded midterms are available for you to download (refer to the Announcements post)

Mean: 29.92
Median: 30.25
Standard Deviation: 7.29
Regrade rules:

- Regrade requests **due at 5pm on Tuesday February 13**. We will not accept any requests after that.
- You must clearly state which answer you are disputing and why your answer fulfills the answer key.
- All regraded grades are final.
- Your **whole exam** will be regraded. Your mark may go up, down, or stay the same.
Midterm 1 Comments

• You all did great! Your TAs and I are happy with the learning you demonstrated on the exam
• The average is about what we expect (it’s the same as previous semesters’ MT 1 average)
• Exams only count for 60% of your final grade. People tend to do very well on the remaining portion. If there is a 90% average on the non-exam portion, that means the class average would be 75%: a great average!
Diversity in Computer Science
Learning Goals

• [CT Impact] Justify the need for diversity in the field of Computer Science with at least two different, valid reasons
• [CT Impact] Outline changes in enrolment of women in Computer Science over the last 40 years
• [CT Impact] List several theories as to why there are few women in computer science
There are lots of different kinds of diversity that computer science doesn't do well at:

- Gender
- Ethnic/racial
- Disabilities

Note that many of the stats that I have come from the US. They still generally hold for Canada, but it's harder to get good numbers/graphs.
Let's start with the percentage of women getting which Bachelor's degrees.

Draw four lines that you think might reflect trends in four fields: Biology, Education, Math, and Computer Science.
Let's start with the percentage of women getting which Bachelors degrees
Underrepresented minorities in the US

Science and engineering bachelor's degrees earned by underrepresented minorities, by field: 1991-2010

Percent

31% of US population was Black, Hispanic, or First Nations in 2010

NOTE: Data not available for 1999.
SOURCE: Women, Minorities, and Persons with Disabilities in Science and Engineering:
UBC Computer Science
Overall enrollment numbers

Total Undergraduate Enrollment by Degree Type

- CS Majors & Software Eng. Majors
- CS Double & Combined Majors
- Minor
- BUCS
- BA
- BCS
- COGS
- Cumulative (All Degree Types)

https://www.cs.ubc.ca/our-department/women/statistics
www.ugrad.cs.ubc.ca/~cs100
Why diversity matters: need for breadth of ideas/cognitive diversity

Different ideas come from different people with different experiences and perspectives
Example: A Braille Math translator

- Nicole Torcolini lost most of her sight at age four due to cancer. She created a computer-based assistive technology device that translates visually incomprehensible braille math (Nemeth), produced on an electronic braille notetaker, into easily-readable print.

- Nicole’s first CS advisor was Richard Ladner at the University of Washington; he grew up with deaf parents and that sparked his interest in technologies for deaf-blind people.

Why diversity matters: need for breadth of ideas/cognitive diversity

Different ideas come from different people with different perspectives

Some of these differences can seem quite silly but be quite profound

“[A speaker] gave an uproariously funny talk about the difficulty women have with a car that has been designed for the 50th-percentile male. Women have different needs, women carry purses, women use a vehicle differently, women are of a different size, etc., all of which make the 'male car' difficult to use.

As I said, it was a very funny talk. However, when I mentioned this to my wife, who has a long involvement with the Defense Department, she said, 'Yes, and it's just as true of fighter planes where it's not funny; it's a life and death matter.'"

- Bill Wulf – member of the National Academy of Engineering
Exercise – form groups of 3-4

Discuss times when you felt that computers were not well designed for what you were trying to do. Describe how having more people who think like you might have helped.

NOTE: I don't care how you define "like you" – maybe it's that your computer is slower than what developers use, so it’s too hard to make some things work. It is NOT a goal to say that there was discrimination.
Computers not designed by people like you

- Canvas marks are released automatically seems like software engineers didn’t really talk to anyone who teaches or the terminology used inside Canvas doesn’t really correspond to what is used in a classroom (e.g., the word Syllabus is used to represent a calendar of due dates when most places uses Syllabus to represent a document of course policies, what we are going to learn, etc.)

- Snap blocks are really small

- Excel crashes a lot when you are trying to use it on a Mac
Why diversity matters: there are more computer science jobs than qualified people

"120K technical computing jobs produced annually, but we graduate only 40K BS degrees in computer science disciplines (i.e., **80K new jobs go unfilled each year**)"

Why diversity matters: computer science is of growing importance to other fields

Local Examples:

- Computational cancer genomics: Sohrab Shah develops statistical models and algorithms to interpret cancer mutations
- Classical studies: Siobhan McElduff digitizes old book catalogues to understand pricing and what it tells us about the world
Shouldn’t we worry about the lack of men in teaching and nursing, too?

• I worry about that, too
• Note that this is a recent turn of events (http://www.nytimes.com/2014/09/07/sunday-review/why-dont-more-men-go-into-teaching.html?_r=0)
• But this is a computer science class
• Plus female dominated fields tend to pay substantially less and have less prestige than male dominated fields (this happened in nursing and teaching, too)
Why are there so few women, and overall lack of diversity, in Computer Science?

• We have some guesses
• No one's entirely sure
• But there are some factors that we can say are issues (we'll do those next)
One problem: it starts early

We can use high school Advanced Placement (AP) exams as a proxy for this

Overall:

Computer Science


Computational Thinking
www.ugrad.cs.ubc.ca/~cs100
So where does it all start?

**Group Exercise**

In a group of 3-4, go to [http://www.amazon.ca](http://www.amazon.ca). Pick out a $30-40 toy as a present for a 5 year old.

Front half of the class picks a present for a girl. Back half of the class picks a present for a boy.
Thinking about your planned purchases

Group Exercise continued:

Describe the process you used to select the toy you decided on. What factors influenced your decision?

- Lego (you like it, cousins like it, everyone likes it) and it’s easy to play with
- Sock shoes (looks like a sock but has a sole) [looks cute]
- Magnet tile blocks (not a choking hazard and colourful)

- When Amazon gives you recommendations, it sorts by gender first then age as opposed to age first
The Lego Ad mixer!

A great example of how advertising shapes gender values at a young age.

http://www.genderremixer.com/lego/
Communicators, Techies, Creators

Let’s look at boys vs girls’ comfort with three types of computer-related tasks
This impacts comfort with tech

### Figure 9. Comfort with Technology – Gender

How comfortable are you doing each of the following? (Percent responding “extremely” or “very” comfortable)

<table>
<thead>
<tr>
<th>Category</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communicators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texting your friends</td>
<td>86%</td>
<td>93%</td>
</tr>
<tr>
<td>Uploading pictures</td>
<td>88%</td>
<td>90%</td>
</tr>
<tr>
<td>Instant Messaging</td>
<td>84%</td>
<td>92%</td>
</tr>
<tr>
<td>Subscribing to an RSS feed</td>
<td>13%</td>
<td>35%</td>
</tr>
<tr>
<td><strong>Techies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning how to use a new software program</td>
<td>62%</td>
<td>84%</td>
</tr>
<tr>
<td>Setting up a new computer</td>
<td>37%</td>
<td>75%</td>
</tr>
<tr>
<td>Setting up a wireless network</td>
<td>26%</td>
<td>59%</td>
</tr>
<tr>
<td>Creating a spreadsheet with formulas</td>
<td>26%</td>
<td>45%</td>
</tr>
<tr>
<td>Fixing a computer when something goes wrong</td>
<td>26%</td>
<td>58%</td>
</tr>
<tr>
<td>Writing your own computer program to solve a problem</td>
<td>12%</td>
<td>30%</td>
</tr>
<tr>
<td><strong>Creators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Editing movies or music on a computer</td>
<td>46%</td>
<td>66%</td>
</tr>
<tr>
<td>Using a computer to do graphic design</td>
<td>42%</td>
<td>54%</td>
</tr>
<tr>
<td>Designing, creating, and maintaining your own personal website</td>
<td>46%</td>
<td>41%</td>
</tr>
<tr>
<td>Programming a new computer game</td>
<td>28%</td>
<td>45%</td>
</tr>
<tr>
<td>Creating new effects for graphics or music-editing software</td>
<td>28%</td>
<td>41%</td>
</tr>
<tr>
<td>Creating new features for a website</td>
<td>27%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Based on these definitions…
Clicker question?

Do you consider yourself a *communicator* (extremely or very comfortable at texting friends, uploading pictures, instant messaging)

A. Yes

B. No
Based on these definitions…
Clicker question?

Do you consider yourself a *techie* (extremely or very comfortable at learning to use new software, setting up a wireless network, fixing a computer when it goes wrong)

A. Yes
B. No
Based on these definitions…
Clicker question?

Do you consider yourself a creator (extremely or very comfortable editing a music or video file, making a website, creating a computer game)

A. Yes
B. No
Which one or more of these do you think impacts whether students go into computer science? Why?

Techies are familiar with technology; positive feedback loop

Creator: learn how to program but to make things that a variety of people use, you have to creative

Communicate what you think is going to work to the users
Stereotype is that people in CS are introverts, like to work alone, but you need to communicate
Who’s more likely to like computer science: Communicators, Techies, or Creators? Why?

- **Techies**
  - Took AP Computer Science: 12%
  - Think Computing would be a good choice of major: 82%
  - Think Computer Science/IT would be a good career: 75%
  - Intend to study Computer Science/Technology in college or pursue a career in Computing: 14%

- **Creators**
  - Took AP Computer Science: 10%
  - Think Computing would be a good choice of major: 53%
  - Think Computer Science/IT would be a good career: 68%
  - Intend to study Computer Science/Technology in college or pursue a career in Computing: 9%

- **Communicators**
  - Took AP Computer Science: 4%
  - Think Computing would be a good choice of major: 46%
  - Think Computer Science/IT would be a good career: 68%
  - Intend to study Computer Science/Technology in college or pursue a career in Computing: 6%
This in turn impacts what students "like"
Then there’s whether people feel that computer scientists are like them.
Why lack of diversity? Bias

Reminder:

**Conscious bias** is when you're biased and you know it (and you're generally not sorry)

**Unconscious bias** is when you're biased... and you may not know it (and if you do, you're sorry)... and you may even be biased against what you believe!
Bias exists many ways

"A research article written by a woman and published in any of the top journals will still receive significantly fewer citations than if that same article had been written by a man."

"Articles published by women in the top IR [International Relations] journals are cited less often than those written by men even after controlling for the age of publication, whether the author came from a [top research] school, the topic under study, the quality of the publishing venue, the methodological and theoretical approach, and the author’s tenure status."

http://curt-rice.com/2013/10/19/the-great-citation-hoax-proof-that-women-are-worse-researchers-than-men/
It even exists in how we think about ourselves

Self-citations are citations made to the author's own work

<table>
<thead>
<tr>
<th>TABLE 5. T-test comparing self-citations among author gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
</tr>
<tr>
<td>Single-authored</td>
</tr>
<tr>
<td>Men</td>
</tr>
<tr>
<td>Women</td>
</tr>
<tr>
<td>Difference</td>
</tr>
<tr>
<td>Coauthored</td>
</tr>
<tr>
<td>Men</td>
</tr>
<tr>
<td>Women</td>
</tr>
<tr>
<td>Difference</td>
</tr>
<tr>
<td>Men</td>
</tr>
<tr>
<td>Mixed gender</td>
</tr>
<tr>
<td>Difference</td>
</tr>
</tbody>
</table>

Notes: ** p < .05; *** p < .01.

http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=9038606
“Many researchers have concluded that stereotypical images, like the gamer from T.V.’s Southpark [...], frequently appear among the list of factors that deter some students from seeing themselves in the field.”

– Carol Frieze, 2011

I’m curious: do you think that you see or hear predominantly negative or positive images of computing?

A. Predominantly negative
B. Predominantly positive
Why lack of diversity: Impostor syndrome

Impostor syndrome is the feeling that you’re not as good as people think you are. It’s the feeling that you’re a fake.

Impostor syndrome clicker question

A. I identify as male and I feel like an impostor
B. I identify as female or other and I feel like an impostor
C. I identify as male and I don't feel like an impostor
D. I identify as female or other and I don't feel like an impostor
E. Other/I choose not to answer this question
Confidence in ability to write a computer program:

- **Students with high math ACT scores**
  - Male CS majors: 63%
  - Male non-CS majors: 60%
  - **Female CS majors: 48%**
  - Female non-CS majors: 44%

- **Students with low math ACT scores**
  - Male CS majors: 53%
  - **Male non-CS majors: 49%**
  - Female CS majors: 37%
  - Female non-CS majors: 34%

Especially interesting: High-scoring female CS students vs. low-scoring male non-CS students
“I’m simply stating that the distribution of preferences and abilities of men and women differ in part due to biological causes and that these differences may explain why we don’t see equal representation of women in tech and leadership.” – James Damore

What are two other reasons we covered in class that account for some of the representation differences? Why? What is at least one thing covered in class that we would expect to be different if this were true?
How to broaden participation in CS?

BC and other Canadian provinces have plans to introduce “coding” into the high school curriculum

Computing the value of coding ahead of its introduction to B.C. curriculum

TRACY SHERLOCK
More from Tracy Sherlock

Published on: September 3, 2016 | Last Updated: September 3, 2016 11:26 AM PST

https://www.cs.ubc.ca/grades-k-12/girlsmarts
What is UBC doing?

One example: Girlsmarts  UBC CS's annual workshops for grade 6 and 7 girls
Subjects like cybersecurity, hardware, robotics, HTML, Human Computer Interaction

https://www.cs.ubc.ca/grades-k-12/girlsmarts
In case you're interested in more...

There's are annual celebrations of women in computer science: [http://www.gracehopper.org](http://www.gracehopper.org) [http://www.can-cwic.ca/](http://www.can-cwic.ca/)
Learning Goals Revisited

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