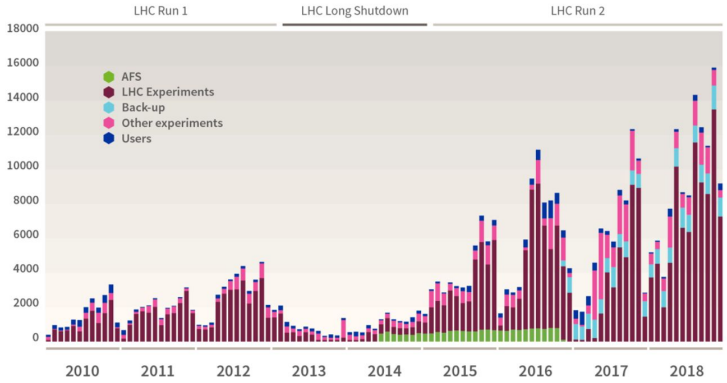
# Software Engineering for Scientists (SWE4S)

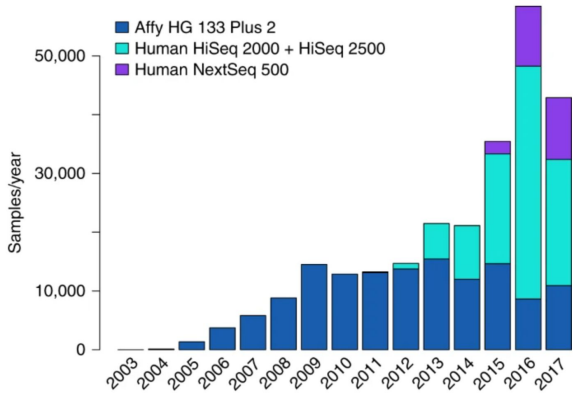
# Today’s plan/objectives

- Course intro/motivation
- Syllabus and logistics
- Howdies
- For next time…




Data (in terabytes) recorded on tape at CERN month-by-month. This plot shows the amount of data recorded on tape generated by the LHC experiments, other experiments, various back-ups and users. In 2018, over 115 PB of data in total (including about 88 PB of LHC data) were recorded on tape, with a record peak of 15.8 PB in November (Image: Esma Mobs/CERN)

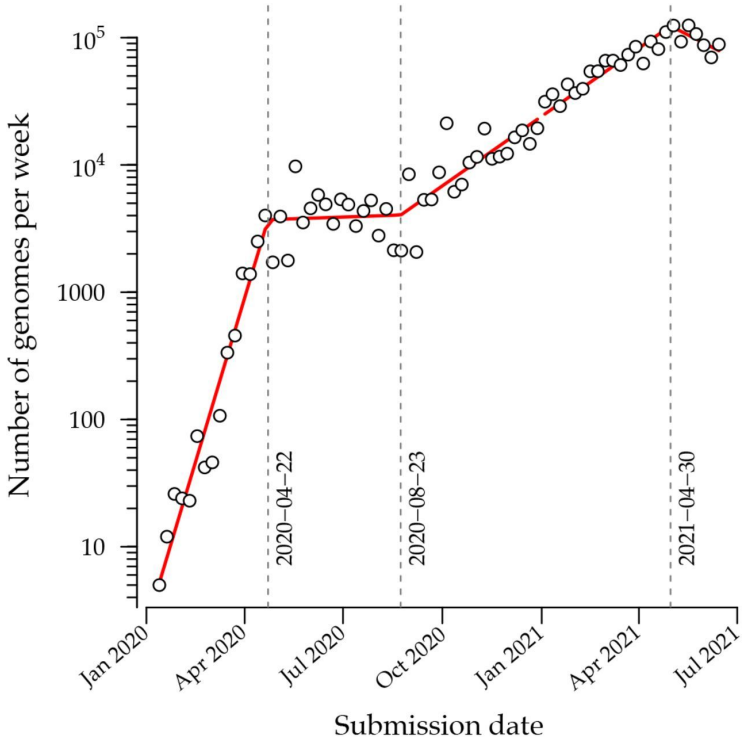
Ozcesmeci, 2019



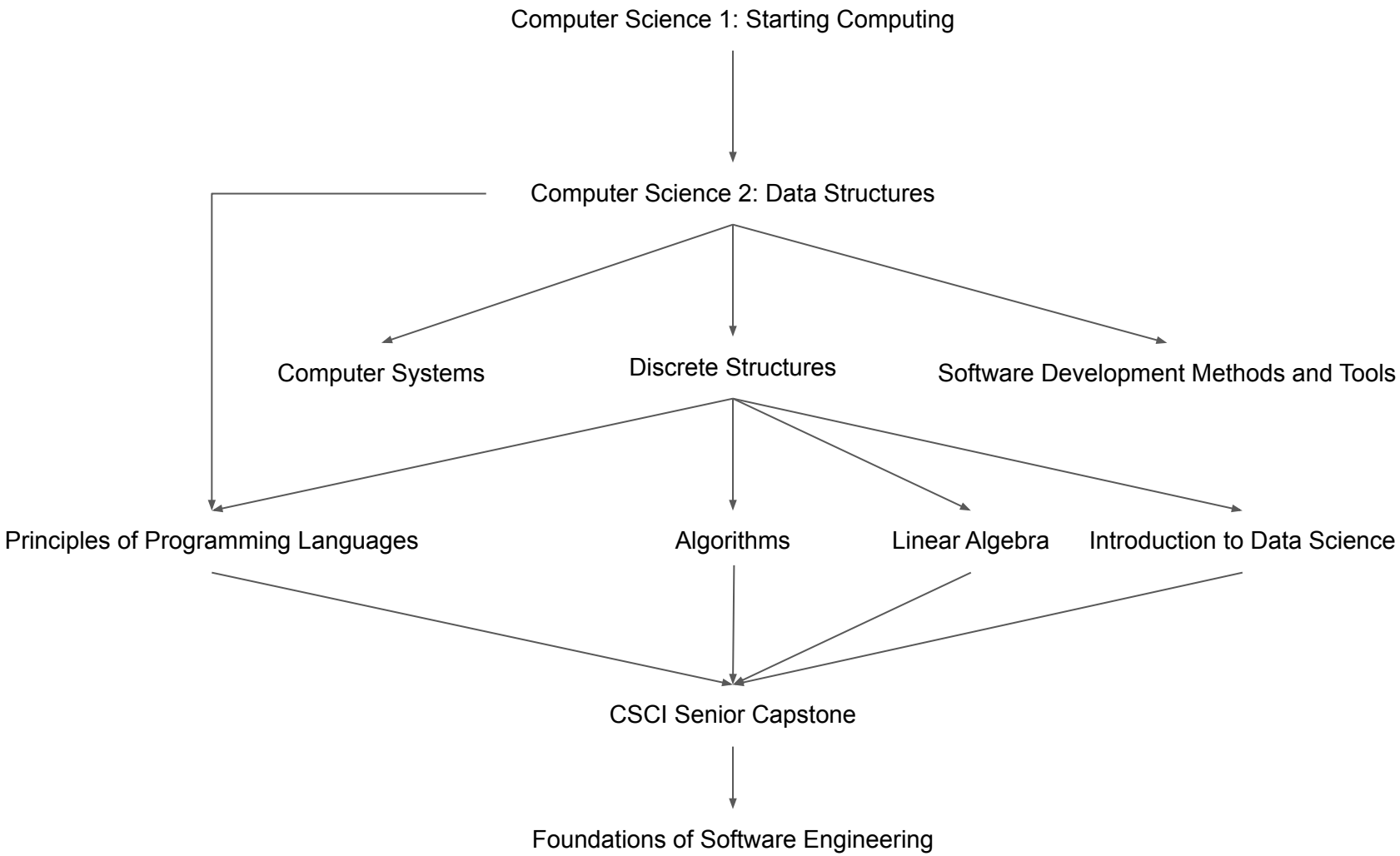

Publicly available RNA-seq samples currently available at GEO/SRA for human and mouse compared to available samples collected with the popular Affymetrix HG U133 Plus 2 platform

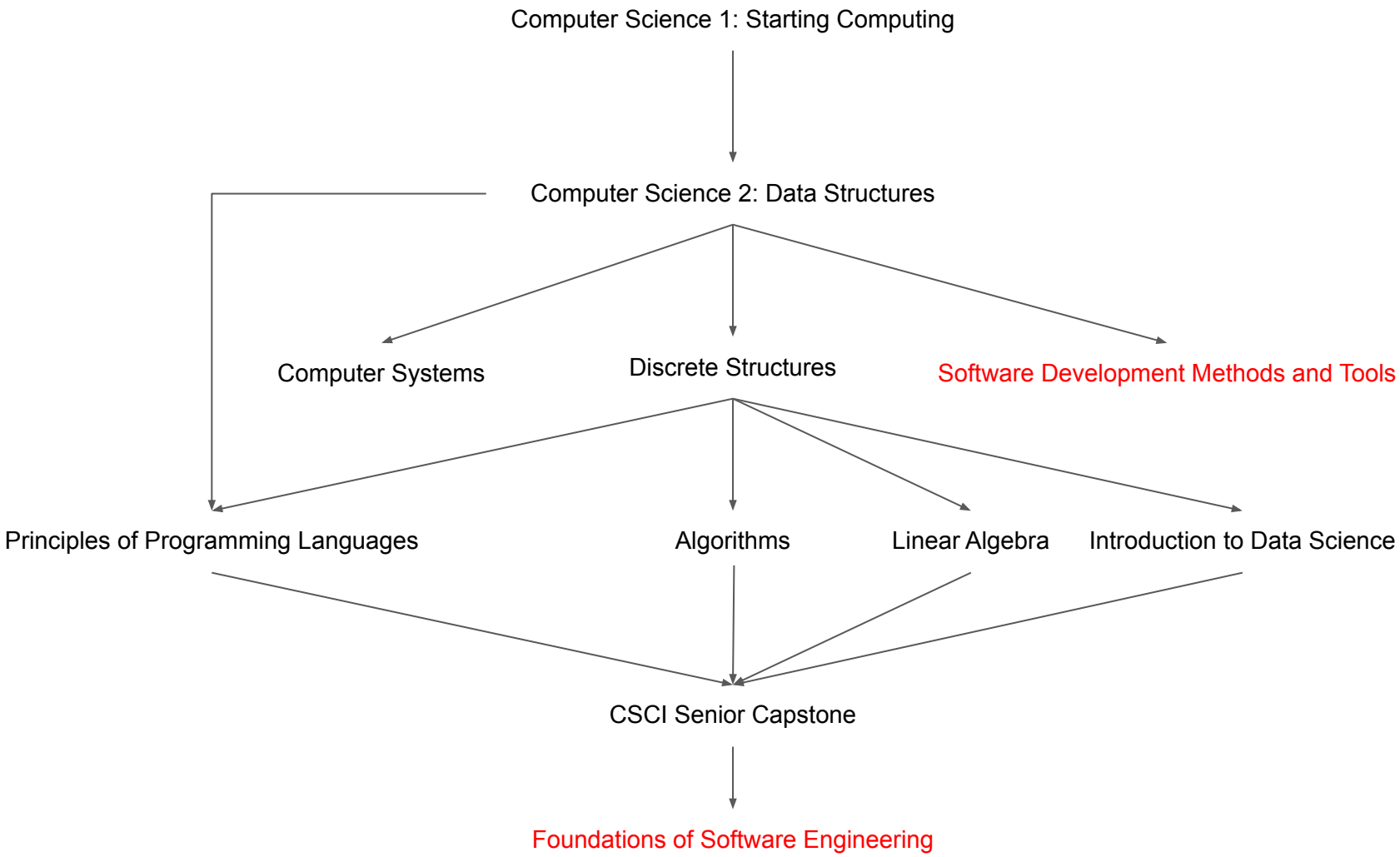
Lachmann, 2018

# Science is becoming data science!




Ferreira, 2021


Computer Science 1: Starting Computing
Computer Science 2: Data Structures
Computer Systems
Discrete Structures
Software Development Methods and Tools
Principles of Programming Languages
Algorithms
Linear Algebra
Introduction to Data Science
CSCI Senior Capstone
Foundations of Software Engineering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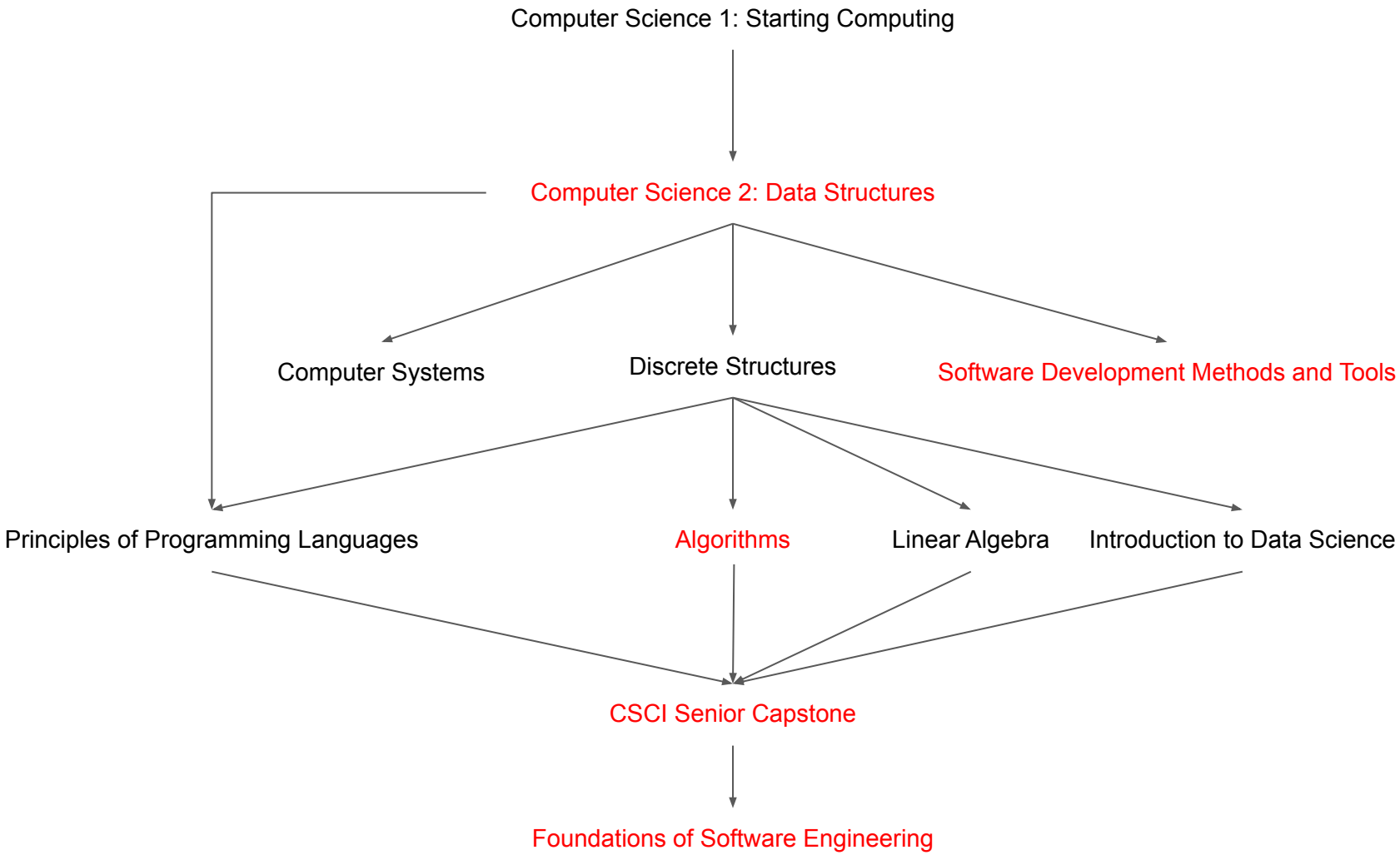
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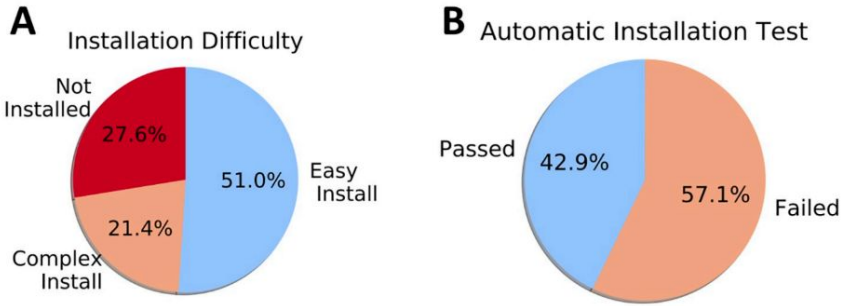
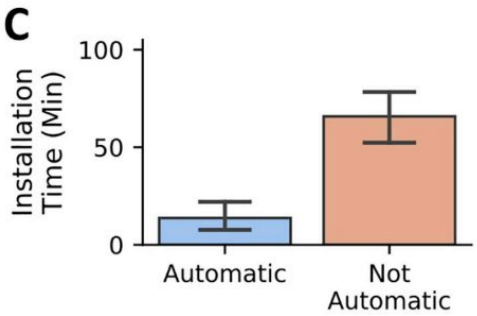
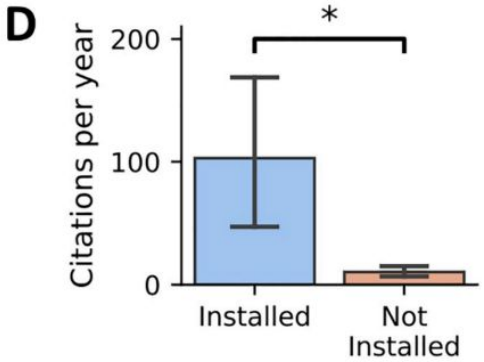



Installation is hard




and slow




and it is affects impact

Mangul, 2019

# A random forest-based framework for genotyping and accuracy assessment of copy number variations

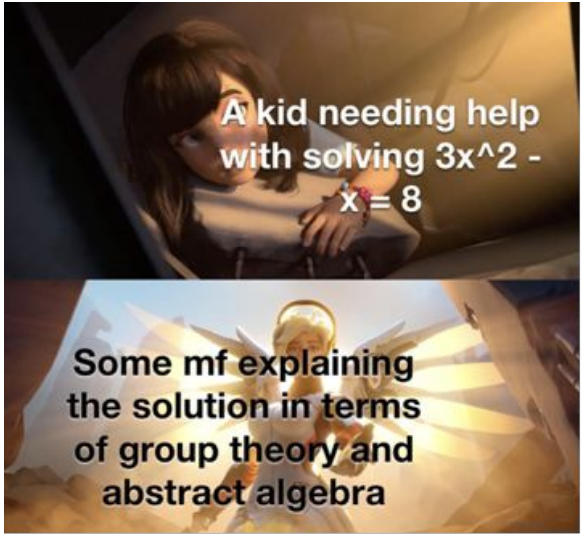
Xuehan Zhuang, Rui Ye, Man-Ting So, Wai-Yee Lam, Anwarul Karim, Michelle Yu, Ngoc Diem Ngo, Stacey S Cherny, Paul Kwong-Hang Tam, Maria-Mercè Garcia-Barcelo, Clara Sze-man Tang, Pak Chung Sham

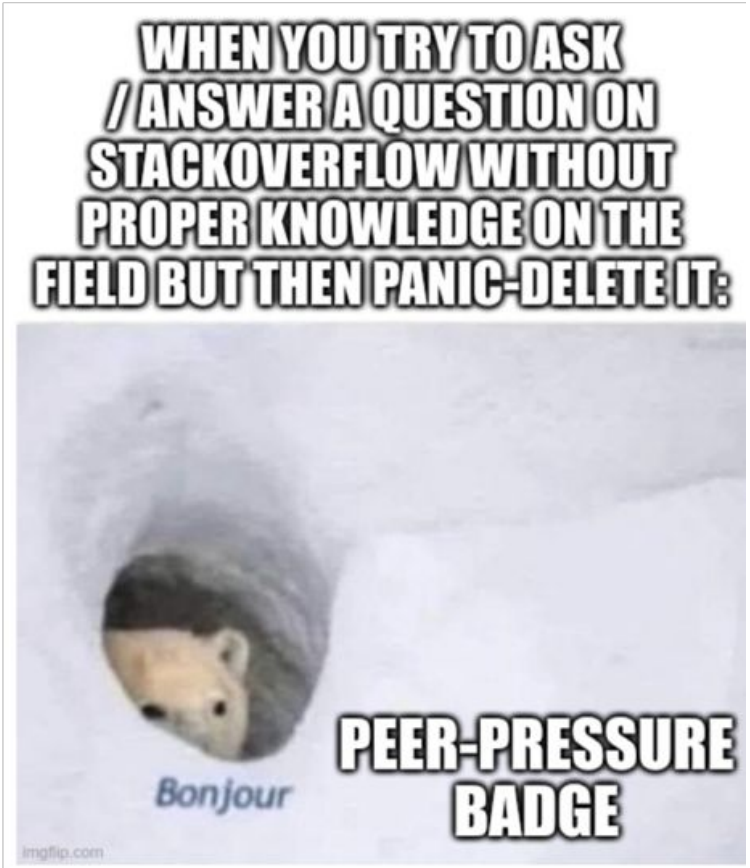
https://github.com/sunnyzxh/CNV-JACG

```
&showLog("Calculating het probability for $sample...");
`/home/yerui/miniconda2/bin/perl $home/bin/Het-prob.pl -f $ref -m $snps -r $precnv -i $bam -o $outdir/$precnvbase.het.prob`;
```

Coding best practices
Version control
Git and GitHub
Testing
Continuous integration
Code reviews
Benchmarking
Workflows
Algorithms
Data structures
Some data science
Project

SWE4S


A kid needing help with solving 3x^2 - x = 8
Some mf explaining the solution in terms of group theory and abstract algebra


WHEN YOU TRY TO ASK / ANSWER A QUESTION ON STACKOVERFLOW WITHOUT PROPER KNOWLEDGE ON THE FIELD BUT THEN PANIC-DELETE IT:
Bonjour
PEER-PRESSURE BADGE
imgflip.com

# Technologies we'll use

- Course communication and announcements: Slack and Canvas
  - Slack is better so let's try to use/lean towards Slack for communication
- Grades: Canvas
- Lecture slides, course notes, PDFs of assignments: course webpage
- Assignment submission: GitHub Classroom

COURSE WEBPAGE + SYLLABUS

# About me

- From Salt Lake City
- Physics + math undergrad
- Applied math PhD at CU, co-advised by Dan Larremore (CS + BioFrontiers) and Stephen Becker (applied math)
- ~1 year at Invitae as bioinformatician
- ~1 year at TetraScience as software and data engineer
- Back at CU teaching this class and doing a postdoc with Ryan Layer (CS + BioFrontiers) and Stephen Kessler (CS)
- This is my first time teaching this class! Feedback and any and all questions are welcome!

# Who are you!?

- Name
- Program and year
- Research interests
- Previous coding and software experience
- Fun fact
- One thing you’re hoping for from this class
- One thing you’re nervous/apprehensive about

# For next time…

- Fill out the getting-to-know-you Google Form
- Get your development environment set up
  - Refer to the notes on the course webpage
  - This might take some time!
- Make sure you can access our course webpage, Slack, Canvas, GitHub Classroom
- Let me know if you have any questions!