Visualization defined & motivated
• computer-based visualization systems
  – provide visual representations of datasets
  – designed to help people carry out tasks more effectively.
• suitable when
  – there is a need to augment human capabilities
  – rather than replace people with computational decision-making methods

Nested model: Four levels of visualization design
• domain situation
  – who are the target users?
• abstraction
  – translate from specifics of domain to vocabulary of vis
    • what is shown?
    • abstraction
  • idiom
    – how is it shown?
    • visual encoding idiom: how to draw
    • interaction idiom: how to manipulate
• algorithm
  – efficient computation

Why is validation difficult?
• different ways to get it wrong at each level
  – theory, visualization foundations
  – tooling: D3.js
  – pre req: CPSC 310
  – HCI not required, but very helpful
  – just 5 spots left!

Evaluation: broadly interpreted
• methods from many fields, qualitative & quantitative
  – controlled experiments in lab, field studies of deployed systems
  – tooling: D3.js
  – theoretical foundations
  – rapid prototyping
  – second-hand data
  – in collaboration with target users
  – top-down/layered: design prototypes
  – bottom-up: data-driven design

Evaluation: widely interpreted
• methods from many fields, qualitative & quantitative
  – controlled experiments in lab, field studies of deployed systems
  – tooling: D3.js
  – theoretical foundations
  – rapid prototyping
  – second-hand data
  – in collaboration with target users
  – top-down/layered: design prototypes
  – bottom-up: data-driven design

Problem-driven work
• design studies
  – in collaboration with target users
  • real data, real tasks
  • intensive requirements analysis
  • iterative refinement
  • deploy tools/systems
  • typical evaluation: field studies
    – pre-design & post-deployment, often qualitative
    – opportunistic collaboration
    – many domains, industry & academia

Technique-driven work
• scalable algorithms & systems
  – new visual encoding & interaction techniques
  • typical evaluation: computational benchmarks
  • typical evaluation: controlled experiments with people (quant)
  • typical evaluation: qualitative assessment
• areas
  – graph drawing, dimensionality reduction
  – human-in-the-loop curation/assessment of ML results

Design studies: domains
• many domains
  – fisheries, in-car networks, journalism, ...
  – genomics
  – Harvard Med School, BC Cancer, UBC Biodiversity, Aglient, ...
  – log analysis
  – Google web search, AT&T web hosting, Mobile e-commerce
  – building & energy usage

Ocupado design study
Ocupado: Visualizing Location-Based Counts
Over Time Across Buildings
Michael Cyganowski
Tamara Munzner

Ugrad course: CPSC 436V
• new-ish, third offering is Jan 2022
  – previous offering
    https://www.students.cs.ubc.ca/~cs-436v/21Jan/
• 4th year majors course
  – theory: visualization foundations
  – tooling: D3.js
  – prereq: CPSC 310
  – HCI not required, but very helpful
  – just 5 spots left!