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? data abstraction
    • why is the user looking at it? task abstraction
• idiom
  – how is it shown?
    • visual encoding idiom: how to draw
    • interaction idiom: how to manipulate
• algorithm
  – efficient computation

Evaluation: broadly interpreted
• methods from many fields, qualitative & quantitative
  – controlled experiments in lab, field studies of deployed systems

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

Technique-driven work
• scalable algorithms & systems
  – typical evaluation: computational benchmarks
• new visual encoding & interaction techniques
  – 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

Why is validation difficult?
• different ways to get it wrong at each level
  – Domain situation
    • misunderstood target user needs
  – Data/task abstraction
    • showing them the wrong thing
  – Visual encoding/interaction idiom
    • the way you show it doesn’t work
  – Algorithm
    • your code is too slow

Courses
• grad course CPSC 547: next offering Sep 2025
• new-ish ugrad course: CPSC 447
  – (first three years was CPSC 436V)
  – current offering
  – next offering Sep 2023, then Jan 2025
• 4th year majors course
  • theory: visualization foundations
  • tooling: D3.js
  • prereq: CPSC 310
  • HCI not required, but very helpful

More info
• book (free through UBC library)
  http://www.cs.ubc.ca/~tmm/vadbook
• papers, videos, software, talks, courses
  http://www.cs.ubc.ca/group/infovis
  http://www.cs.ubc.ca/~tmm