CME 307 / MS&E 311: Optimization

How to give a talk

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Outline

How to Give a Talk

Tell a story

- ▶ what's the problem?
- ▶ preview your result
- ▶ what solutions have others tried?
- ▶ how does your idea work? and how is it different from previous work?
- ▶ gory details / theory / how it works
- ▶ applications / experiments / numerical evidence
- ▶ now what?

Inspiration for this meta-talk: Heilmeier Catechism

Heilmeier (DARPA director in 1950's) taught that grant proposals should include:

- ▶ What are you trying to do? Articulate your objectives using absolutely no jargon.
- ▶ How is it done today, and what are the limits of current practice?
- ▶ What is new in your approach and why do you think it will be successful?
- ▶ Who cares? If you are successful, what difference will it make?
- ▶ What are the risks? How much will it cost? How long will it take?
- ▶ What are the mid-term and final "exams" to check for success?

for a talk, switch all these to the past tense

What's the problem?

kinds of problem

- ▶ a real problem (whose?)
- ▶ an "open" problem (why does it matter?)

pro tips:

- ▶ you'd better "solve" the problem by the end of the talk. . .
- ▶ pictures help grab attention

Preview your result

state your contribution

- ▶ so audience understands what you did
  (and can decide to pay attention or not)
- ▶ maybe a theorem, maybe a picture, maybe in words
- ▶ might require introducing some key definitions

pro tips:

- ▶ leave caveats for later
  (but mention now if they're major or minor caveats)
- ▶ no one will listen any more if this part is confusing

What solutions have others tried?

why compare to related work?

- ▶ shows audience how hard the problem is
- ▶ helps audience understand what you did
  (and what you didn't do)
- ▶ keeps your colleagues feeling collegial

pro tips:

- ▶ cite all authors by name if ≤ 3 authors
- ▶ maybe:
  - ▶ use your initial instead of name (eg, Kallus and U 2018)
  - ▶ bold your name (eg, Kallus and **Udell** 2018)

How does your idea work?

- ▶ this section is usually longest
- ▶ divide into subsections to explain parts of your approach
- ▶ by the end, the audience understands **why** your idea works
- ▶ use **as little** technical machinery as possible
- ▶ provide intuition

pro tips:

- ▶ provide quick high level overview **and** details
- ▶ so non-experts **and** experts understand how it works
- ▶ imagine the first year PhD student in the audience

Gory details

- now you can impress people and lose them
- make it clear you have technical chops
- make the experts think you're smart
- but none of this matters
- because the audience already understands
- the important ideas

pro tips:

- omit this part from a public talk
- possibly also omit from a colloquium
- definitely include in a job talk
- probably include for this class, to build endurance
- you can skip this if your talk is running over

Experiments

- prove that your ideas work
- show that they yield a useful solution
- and that they actually solve the problem

pro tips:

- ask for people to restore their attention (after gory details)
- make experiment slides self-contained
    - state experimental settings, label axes and curves clearly, . . .

Know your audience

imagine your audience

- ▶ what do they know already? what will they find surprising?
- ▶ often helps to imagine writing the talk for **one particular person** who you know well
- ▶ while giving the talk, look at the person whose face is giving feedback
- ▶ (while listening to a talk, **be** the person giving feedback)

it's ok to lose (some of) your audience

- ▶ but you should plan for **who** you'll lose and **when** you'll lose them
- ▶ generally, everyone should understand everything except for the "gory details"
- ▶ afterwards, tell people when to start paying attention again

Concluding

- state conclusions
- state research directions
- provide references
- ask for questions

Style

technology

- ▶ LATEX/ beamer presentations are common in optimization
- ▶ powerpoint / keynote more common in machine learning
- ▶ google slides for collaborative development
- ▶ theorists can make slides that contain only words, equations, and plots
- ▶ systems presentations usually come with fancy pictures and animations

length

- ▶ rule of thumb: one minute per slide
- ▶ more if there are lots of pictures
- ▶ less if there's lots of math to explain
- ▶ have sections you can cut easily: gory details, applications
- ▶ know at what time you should arrive at each section

Style

words

- ▶ brevity is the soul of wit
- ▶ don't distract your audience
- ▶ use bullets, not paragraphs
- ▶ beware of line breaks
- ▶ pick a convention and stick to it
    - ▶ capitalization, punctuation, phrases vs sentences, etc

equations

- ▶ define your terms
- ▶ define as little as possible
- ▶ use words instead of symbols where possible

Style

animations

- ▶ must have semantic meaning

delivery

- ▶ speak slowly and clearly
- ▶ require the audience to ask questions
- ▶ show that you're a human
  (humor, look at audience, ask questions, stop to think)
- ▶ get ready for improvisation!

Style gotchas

every bullet should be of the same type

- ▶ examples
- ▶ applications
- ▶ properties
- ▶ steps of algorithm

text above and/or below contextualizes bullets

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definitions

- ▶ should be typeset clearly so readers know what to remember
- ▶ use formatting to show what is being defined
- ▶ define terminology before using it
- ▶ provide a name for every variable (and use both!)

Style gotchas II

title

- ▶ is best compression of takeaway from slide
- ▶ statement is better than phrase

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slides are for your audience, not for you

- ▶ they are not a script
- ▶ they should not distract audience from what you say
- ▶ they should help audience organize and make sense of what you say

Professionalism

- arrive 15 min (or more) early to set up
- bring (and test) your A/V equipment
    - dongles, presenters, power cord *etc.*
- look the part
    - dress one notch more formal than the audience in your venue
    - make it easy for your audience to pay attention to your talk
        - your face should be easy to see
        - your clothes should not be distracting

More resources

- scientific writing
- presentations

Scheduling talks

▶ sign up on the class spreadsheet!