Presenting research workshop

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Outline

• Introduction to workshop and me/my research
• Objectives of presenting research
• How to achieve your objective
Workshop form

• (Inter) active, will collect input from you
• We will try to compile a useful document (on Google docs) with our joint knowledge.
• Some work will be in small groups, best to have at least one laptop in each group.
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About me: I am a lowland guy

1 m below sea level
Subsidence + Sea level rise

Solution 1: Fix problems
Controlling water systems
Risk-based Water System Operation

\[ \text{RISK} = \text{Probability} \times \text{Consequence} \]
Solution 2: Go to mountains
Val Ferret experimental watershed, Switzerland
Making sense of the water flows
Weijs, S.V.; Diebold, M.; Mutzner, R.; Golay, J. & Parlange, M.B.
Using hacked point and shoot cameras for time-lapse snow cover monitoring in an Alpine valley
*Geophysical Research Abstracts, 2012, 14, 8244*
Hydrology: a zoo of scales
Understanding vs. Prediction

Feynman:

“Nobody understands quantum mechanics”
Hydrological information flows

Environment
Observations
Models
Predictions
Decisions
Environment + utility
Algorithmic Information Theory

independently developed by Kolmogorov (1968), Solomonoff (1964) and Chaitin (1966)
Which algorithm zips P best?
Hydro(UN)ZIP:

1. RLE on dry spells
2. Take differences
3. Try parametric distributions
4. File is complete description
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Objectives for presenting

• Scientific exchange
• You want to sell your conclusion
• You want to sell your method
• You want to sell your paper
• You want to sell your ideas
• You want to sell yourself
• You don't buy the status quo opinion (revolution!)
Have a story

• Objective is served by take home message
• Whole narrative depends on message
• Make sure you have a take home message
• Don’t be afraid to cut material
• Objective is rarely to show all you have done
Exercise: Elevator Pitch / Objectives

• Form groups
• Some of you get 2 minutes time to present (AGU) research in elevator pitch.
• If you want, use blank paper as poster
• All will write down key take home point of pitch
• And write down guess of objectives
Shared Document

Think of your main objectives

• If not present, add them to the doc
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How to convince...
How to convince your advisor

• Convince to pay trip and let you present
• Exciting new results: I have earned it!
• Perfect session, networking opportunity
• Opportunity to learn from other presentations
• Meet potential future employers (might convince you to finally wrap up Thesis)
• ...

How to convince the convener

• First need to choose a session...
• Very important for objectives
• Session defines your likely audience
• Impress certain conveners?
• Choosing right session gives more chances of talk (if you aim for that).
• Other reasons for choosing session? ...
How to convince the conveners

• Read the abstracts carefully for match
• Imagine session conveners aim for session
• Is there a message?
• Can you talk contribute to their objective?
• Maybe tune your wording
• Do the conveners know your work?
• Is your topic controversial? (debate!)
• Other ideas? .....
Examples

H31M: Predictions, Models and Hydrological Information: How Much Certainty Should We Expect in an Uncertain World?

Channelling information flows from observation to decision; or how to increase certainty

To make adequate decisions in an uncertain world, information needs to reach the decision problem, to enable overseeing the full consequences of each possible decision.

...
Examples

Ensemble hydro-meteorological forecasting
Expected benefits of ensemble hydrological predictions comprise higher forecasting skills, improved risk assessment and well-informed decision-making in operational water management. Ensemble hydro-meteorological forecast and warning systems have been developed to improve flood control and drought management, as well as to optimize water allocation and regulation for different uses. The value of such systems has been recognized across a wide range of sectors and users, including river basin authorities, public agencies, private entities and commercial industries.

Extracting local information from crowds through betting markets
In this research, a set-up is considered in which users can bet against a forecasting agency to challenge their probabilistic forecasts. From an information theory standpoint, a reward structure is considered that either provides the forecasting agency with better information, paying the successful providers of information for their winning bets, or funds excellent forecasting agencies through users that think they know better. Especially for local forecasts, the approach may help to diagnose model biases and to identify local predictive information that can be incorporated in the models. The challenges and opportunities for implementing such a system in practice are also discussed.
Exercise:

• Take a look at your abstract and the session you are presenting in.
• Could you tune it more next time?
How to convince your partner??

• Conference important for career
• World depends on science that is sparked here
• It is not just drinking with colleagues
• Can probably be home in 6 hours if labor starts
OK! You made it here!

• Now convince your audience...
Methods

• Dozens of guides, lots online
• But many things are very personal / individual
• I liked this one:
Who is your audience?

- Specialized session or more general?
- Use of Jargon
- Preaching to the choir?
- Are they human?
Many concepts have been published relevant to improving the design of PowerPoint™ (PP) presentations for didactic purposes, including the redundancy, modality, and signaling principles of multimedia learning. In this article, we review the recent neuroimaging findings that have emerged elucidating the neural structures involved in many of these concepts. First, we explore the research suggesting that the brain utilizes similar structures to process written text and oral speech leading to neural competition and impaired performance during dual linguistic text/audition tasks (redundancy principle). Next, we examine research that demonstrates that the brain processes visual images in a manner different from and parallel to oral speech leading to improved performance during dual nonlinguistic visual/audition tasks (modality principle). Finally, we look at how the brain responds to contextual and direct attention cues (signaling principle). We link this research to PP design and suggest a number of concrete ways to implement these findings to improve the didactic strength of slide-show presentations.

Key points for me

• Max 6 lines of 6 words text.
• Wherever possible words → pictures
• Make sure there is a story-line
• Don’t be monotonic
• Don’t use humor
• Unless you have to ...
Form $\leftrightarrow$ content

- Is a trick I oft n use. Not sure if Transferable.
- Might work because my research is about info
- Example of Pico from EGU 2014
Information content of your prior hydrological knowledge for streamflow prediction

Steven Weijs, EPFL, Switzerland

Past data

No prior knowledge: NULL

Prediction:

TRUTH

Gambling → info

How many answers do you need?

Beat the Computer!

Play the game!

Data compression → info

Uncertainty = nr bits to encode = compressed size

1 bit = one answer to non-redundant question

101 = YNY

WHY?
Computer prediction: no prior knowledge

Data driven prediction:
• Uses past data to predict future value
• Often based on optimizing performance of prediction of past data
• But also parsimony requirement
• The more pattern, the less randomness, the easier to predict

Quality prediction = -log(P_{true})
Human prediction: prior hydrology knowledge

- Autocorrelation
- Seasonality
- Rising/Falling Limb
- Filling of storages

10+ years of education

It looks like a recession curve, so probably $-\frac{dQ}{dt}$ slowly decreasing

 current entropy: 4.4464 bits

Past data

= BETTER?
Data compression: no prior knowledge

Compressed file: 01001011101000110101101

Better prediction = better compression

Compress by using shortest codes for most probable observed values

In compressed file each 0 or 1 is the answer to a good yes/no question
Educated guessing: with prior knowledge

Theory: nr of questions needed \( \approx -\log(P_{\text{true}}) \approx \text{Entropy (prior)} \) (on average), best is ask 50-50%
The Game (to play, find author with laptop):

Objective:
Narrow down to the truth in min. number of questions

- Left click: is value higher than \( Y_{click} \)?
- Right click: is value equal to \( Y_{click} \) (within 1)

Conditional histogram is updated after every answer; blue: past data, red: past +uniform for missing

Current entropy: 4.4464 bits

Nr of questions needed is compared with compression of computer
Least bits wins

click left to ask higher/lower question, or right for direct guess
Why?

- We hydrologists claim to know something, otherwise we can leave flood prediction to data mining computers.
- Hydrologists want to prove their model is better and use ad-hoc evaluation criteria.
- Hard info cannot be fooled. If you know, then predict! (in competition with other models).
- Lot of potential in hydrology for prediction competitions and betting markets.

Questions/comments/play level 2? : Steven.weijs@epfl.ch
Exercise

• Form groups
• 1 person explains research to others in group
• Everyone in group individually writes down ideas for form – content or gadgets
• Then discuss in group to come up with best ideas.
MY ANSWERS TO ANNOYING BEARD QUESTIONS:

1. You like that show "Duck Dynasty?"
   No, never heard of it.

2. Isn’t that beard annoying in the summer?
   No, manliness is not seasonal.

3. When are you going to shave?
   I don’t understand your question.

4. What’s the most annoying thing about having a beard?
   The questions.

Source: pinterest
Motivations for questions

• Praise you or test you
• Clarification
• Ask about bigger picture
• Point out error
• Contrast to own research finding
• Get speak time, project self
• Convener asks because no other questions
Answering Questions

• Repeat question if needed
• Try to answer to the point and concisely
• Don’t feel attacked. Explain calmly
• If correct criticism, acknowledge and thank
• Escape answers (might be true!)
What can go wrong?

- Computer crashes $\rightarrow$ no slides (Backup!)
- Equation fonts not recognized
- Video clips often don’t work
- Monotonic voice
- Over-pointing
Over-pointing
What can go wrong, will go wrong

• Share your story...