COMP2550
Advanced Computing R&D Methods

Lecture 5: Presenting Research

Why Communicate?

1. Your supervisor/lecturer/colleague tells you to

2. You have a moral imperative
   someone is paying you to do the research

3. **Your research has no value if other people do not know about it**

4. You want feedback

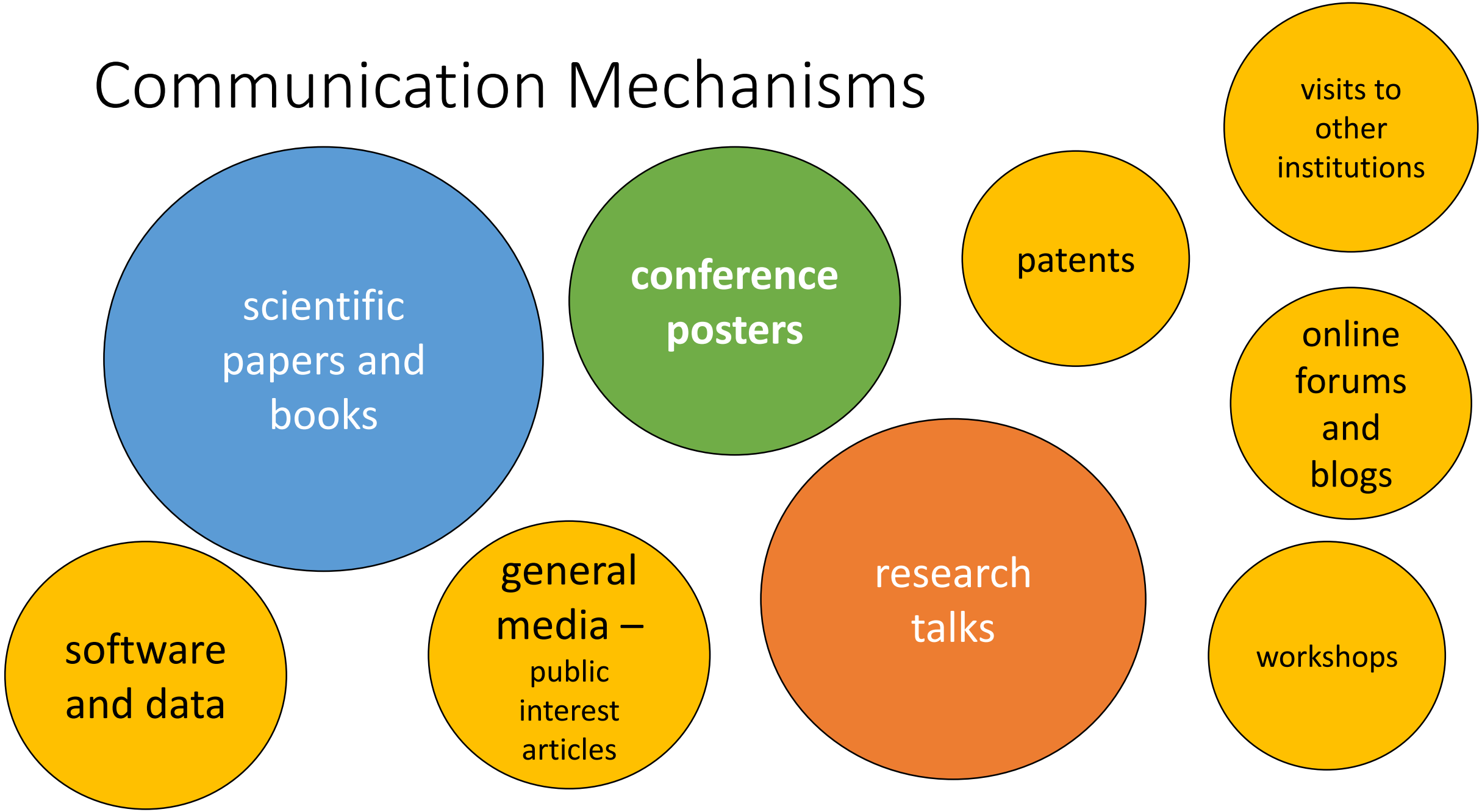
You Are Not Your Research

- Our ideas are external to us so don't be afraid to communicate them
- You can share half-baked thoughts…

  … and (sometimes) it is good to do so
- Some people worry about ideas being "stolen"
  - Take this as a complement
  - And if you've had one good idea (worth stealing) you'll have many
  - Sometimes, if you're in a commercial space it makes sense to keep certain ideas secret, but even in these scenarios you'll want to disclose eventually (e.g., via a patent)
- Criticism of your ideas is not criticism of you

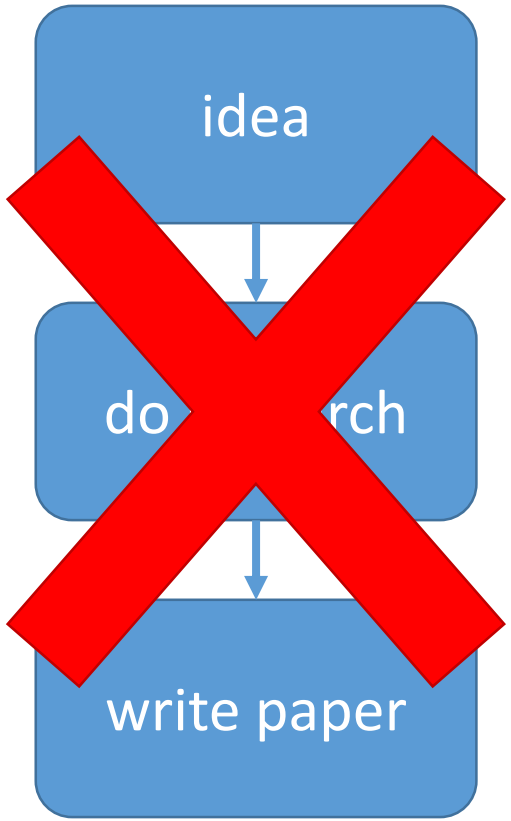
  (but you can be criticised for mechanical things, e.g., wrong citations, incorrect theorems, spelling errors)
- Most important thing: **be clear about what it is that you're trying to do**

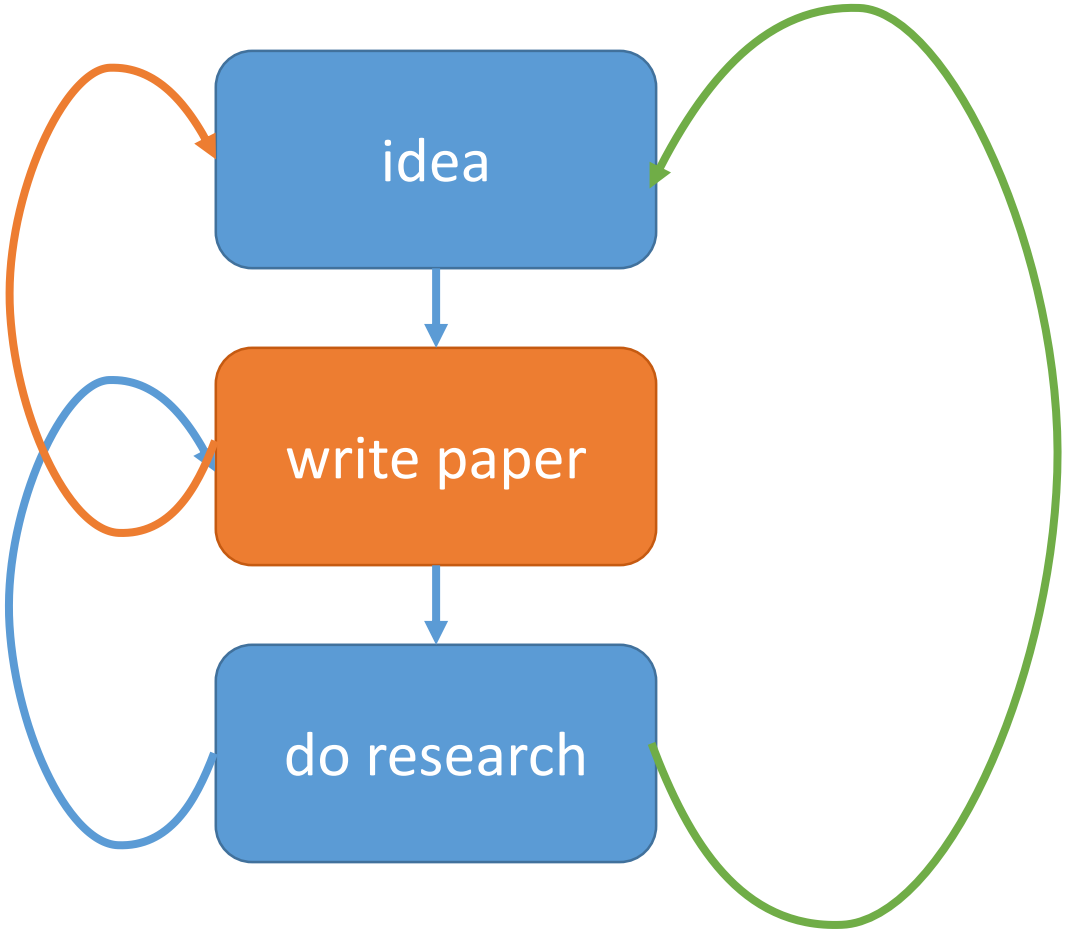
Communication Mechanisms



Scientific Papers

Publication Process





Publication Process

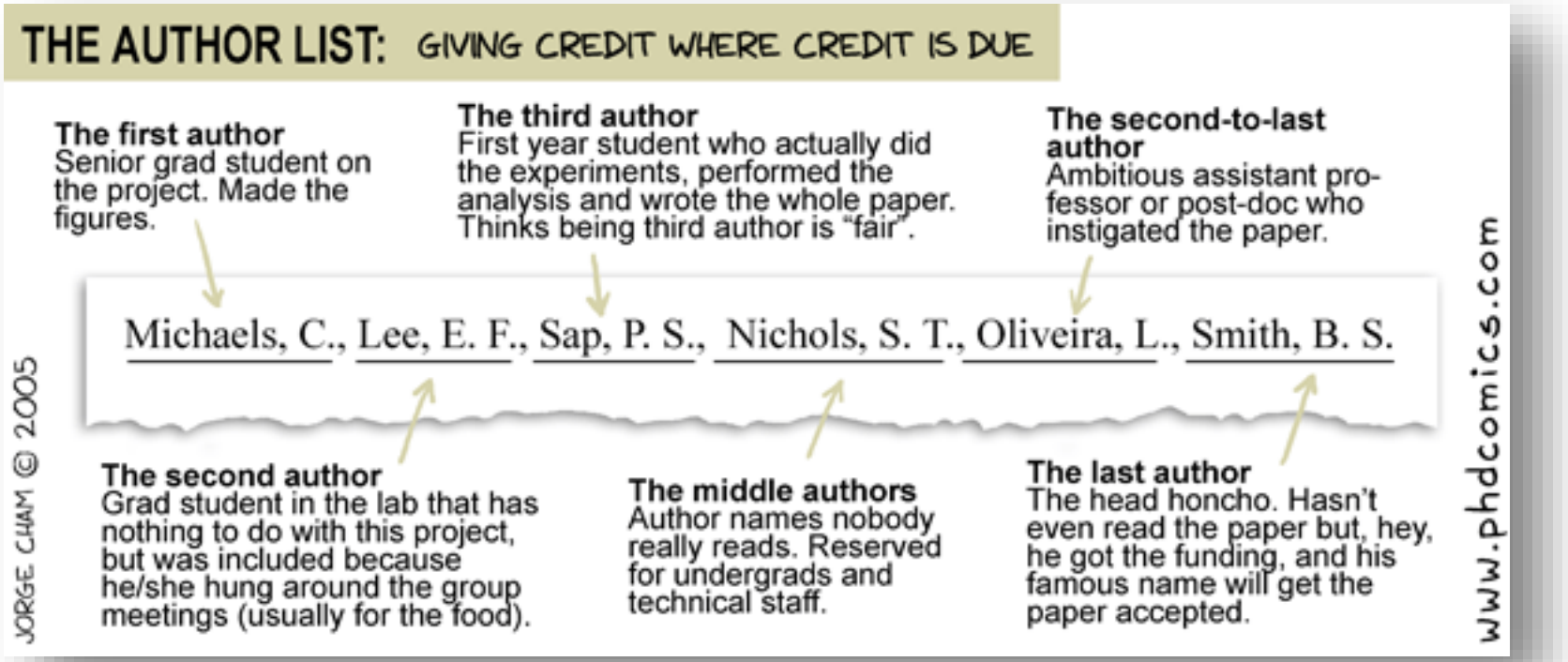
- **Warning:** every conference and journal is slightly different
  - Understand the venue and the audience; and always read the instructions to authors!

1. Choose the venue appropriate for your work
2. Finalise the draft of your paper
   - Proofread it, spell check it, revision control it (and data), get co-authors approval
3. Submit for review (usually anonymous)
   - Sometimes with a cover letter and supporting (supplementary) material
4. Journal editors may reject outright. Go to step 1.
5. Otherwise receive reviews back (can be many months later)
6. Respond to reviews (and maybe resubmit a revised paper and go to step 3)
7. Accept or reject notification (can be many months later)
   - If accepted, prepare and submit camera ready version
   - If rejected, analyse why then go back to step 1

Where to Publish?

- Think about your audience
  - Where is the best venue?
  - Discuss this early on in the project
  - Some venues (e.g., conferences or journal special issues) will have deadlines
- Maximise impact
  - Do quality work and aim high
  - Don’t fear rejection (the process is noisy anyway)
    - Fear of failure retards creativity and impact
- If you wouldn’t read a paper from some venue, don’t publish there

Authorship


THE AUTHOR LIST: GIVING CREDIT WHERE CREDIT IS DUE
The first author
Senior grad student on the project. Made the figures.
The third author
First year student who actually did the experiments, performed the analysis and wrote the whole paper. Thinks being third author is "fair".
The second-to-last author
Ambitious assistant professor or post-doc who instigated the paper.
Michaels, C., Lee, E. F., Sap, P. S., Nichols, S. T., Oliveira, L., Smith, B. S.
The second author
Grad student in the lab that has nothing to do with this project, but was included because he/she hung around the group meetings (usually for the food).
The middle authors
Author names nobody really reads. Reserved for undergrads and technical staff.
The last author
The head honcho. Hasn't even read the paper but, hey, he got the funding, and his famous name will get the paper accepted.
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Authorship

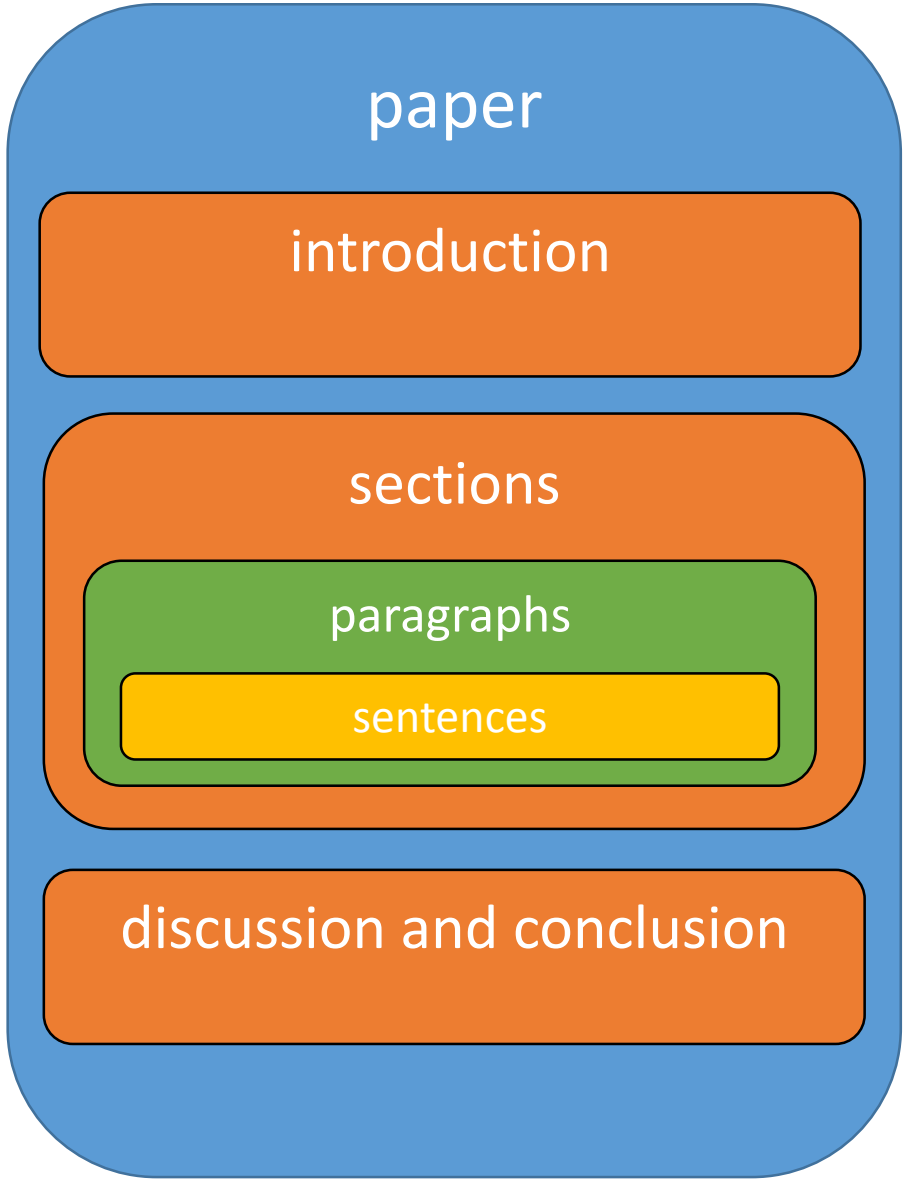
- This is important
  - ANU Policy on Responsible Practice of Research
    - https://policies.anu.edu.au/ppl/document/ANUP_001235
- All authors (including co-authors) should
  - have contributed to the research in the paper
  - agree on the publication venue
  - have written part of (or at least proofread) the final version of the paper
  - made reasonable attempts to check the findings
- Reputations can be damaged if an author appears on a paper with which they were not involved

Dual Submissions

- You cannot get credit for the same work twice
- Many venues have policies against dual submission
  - If a paper is found be have been submitted to two different venues it will be rejected without review
  - Some exceptions: unpublished workshop papers, technical reports, arXiv
- Often conference papers will be expanded into journal publications
  - Theses will also often contain previously published material
  - Previous publication must always be acknowledged

Paper Structure

1. Title
2. Abstract
3. Introduction
4. Background and Related Work
   - (sometimes at the end)
5. Technical sections
6. Experiments
7. Discussion and Conclusion
8. Bibliography



1. Title

- First impression of a paper
  - Succinct
  - Meaningful
  - Memorable
- Don’t use acronyms or abbreviations
  - “A Modified DD Algo. for MRF Inf.”
  - (sometimes this rule can be broken)
- Don’t try to be too smart or trendy
  - “How to beat state-of-the-art by 5%”
  - (sometimes this rule can be broken)

2. Abstract

- Write the abstract first; re-write the abstract last
- If you can't capture your idea in an abstract you probably don't know what you're doing and/or need more perspective on your problem

- The abstract should contain four points:
  - Problem statement
  - Your contribution
  - Results
  - Meaning / interpretation

3. Introduction

- Start telling your **story**
  - Your story is not a chronology of your research
- Describe your problem
  - Why is it important/interesting?
  - How was it solved previously?
- State your contributions
  - Your readers will think, “wow, I’d better read on”
  - Should be refutable
    - the remainder of the paper must substantiate your claims
- Do not include a paragraph, “The rest of the paper is structured as follows.” Life is too short, and you usually don’t have space anyway.

4. Background and Related Work

Background

- If your audience may not have the necessary background you provide a brief summary
  - But don’t expect it to be read, most experienced researchers will skip it

Related work

- Beginning or end?
- Don’t make other works look bad; give credit where it is due
- Don’t explain every detail of other works
- Distil ideas and contrast to your approach

5. Technical Sections

- This is the payload of your paper
- Keep the **story** going
  - Include everything that is necessary but focus on what is important
  - Your paper must provide the details but first convey the ideas
  - Remember your audience
- Defend your approach
- Be precise
  - If your writing is sloppy the reader will assume your research was sloppy

- Include examples
- Give intuitions
- Explain all notation and acronyms

6. Experiments

- Not all papers have experiments, e.g., a theory paper may just prove a theorem

- Your experiments should be reproducible to others skilled in the field
- If at all possible release your code and your data

- Don’t just show good results, show poor ones too
  - Give intuitions into when your method works and when it fails

7. Discussion and Conclusion

- Summarise your work; don’t just repeat what you’ve done
- Give intuitions
  - Often people are reading your paper to get ideas for their own research

- It is very rare that a paper ends research in a field, discuss what work is left to do

- The last sentence is the one your audience is likely to remember most (if that have gotten this far); end of a high

8. Bibliography (and Citations)

- Use BibTex (I recommend the `natbib` package)
- Cite the appropriate work
  - Gratuitous citations do not impress
  - Incorrect citations irritate
  - Missed citations infuriate
- Make sure you spell the authors names correctly
  - one of them may be your reviewers
- Essential information (title, authors, venue, year)
- Plurality of authors
  - **one:** “Gould”, **two:** “Gould and Nisbet”, **three or more:** “Gould et al.”
- Don’t use citations as nouns
  - E.g., “Gould et al. [1] proposed …” instead of “[1] proposed …”

Mechanics (Tips)

"I didn't have time to write you a short letter so I wrote you a long on instead"

- Use LaTeX (and BibTeX)
- Use revision control
  - If your co-authors refuse, make them
  - If your supervisor refuses, use it for him/her
- Be organised
  - directory structure, paper structure (whitespace, comments)
  - Use consistent naming convention (e.g., `<keyword>-<venue>-<year>`)
  - Use Latex macros
- Be precise and **tell your readers what they need to know when they need to know it**
- Plan your paper before you being writing; jot down notes while writing
- Rewrite
  - Don't be afraid to throw out what you've already written (that's one reason why you're using revision control)
  - Remove unnecessary words, remove unnecessary words, remove unnecessary words
- Improve your writing by reading/reviewing other works (both good and bad)

Before Submitting Your Paper

- Take a break, step away from your computer, go get a coffee
- Re-read the instructions to authors
  - Should the paper be anonymous?
  - Is it in the right format? Are you within the page limits?
- Find a quiet place and carefully proofread your paper
  - Read it multiple times checking for different things
  - Make sure everything is readable when printed out (pay attention to figures)
- Convince someone else to carefully proofread your paper
- Run a spllchckr!
  - But a spellchecker correct grammatical errors will not
- Commit the submitted version to revision control

How to Respond to Reviews

- Identify key points and factor them out
  - Make sure you address all major concerns
  - Often rebuttals have word limits

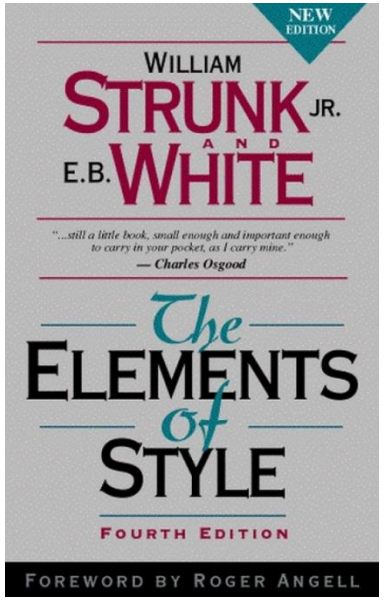
- Be polite. Be succinct. Be direct.
  - If your paper has no hope of being accepted, don’t waste the reviewers time further. Thank them and move on.

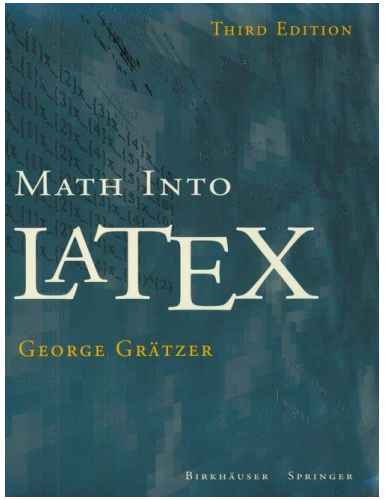
- Write your response for the reviewers and, more importantly, the editor (or area chair)

How to Improve Your Writing

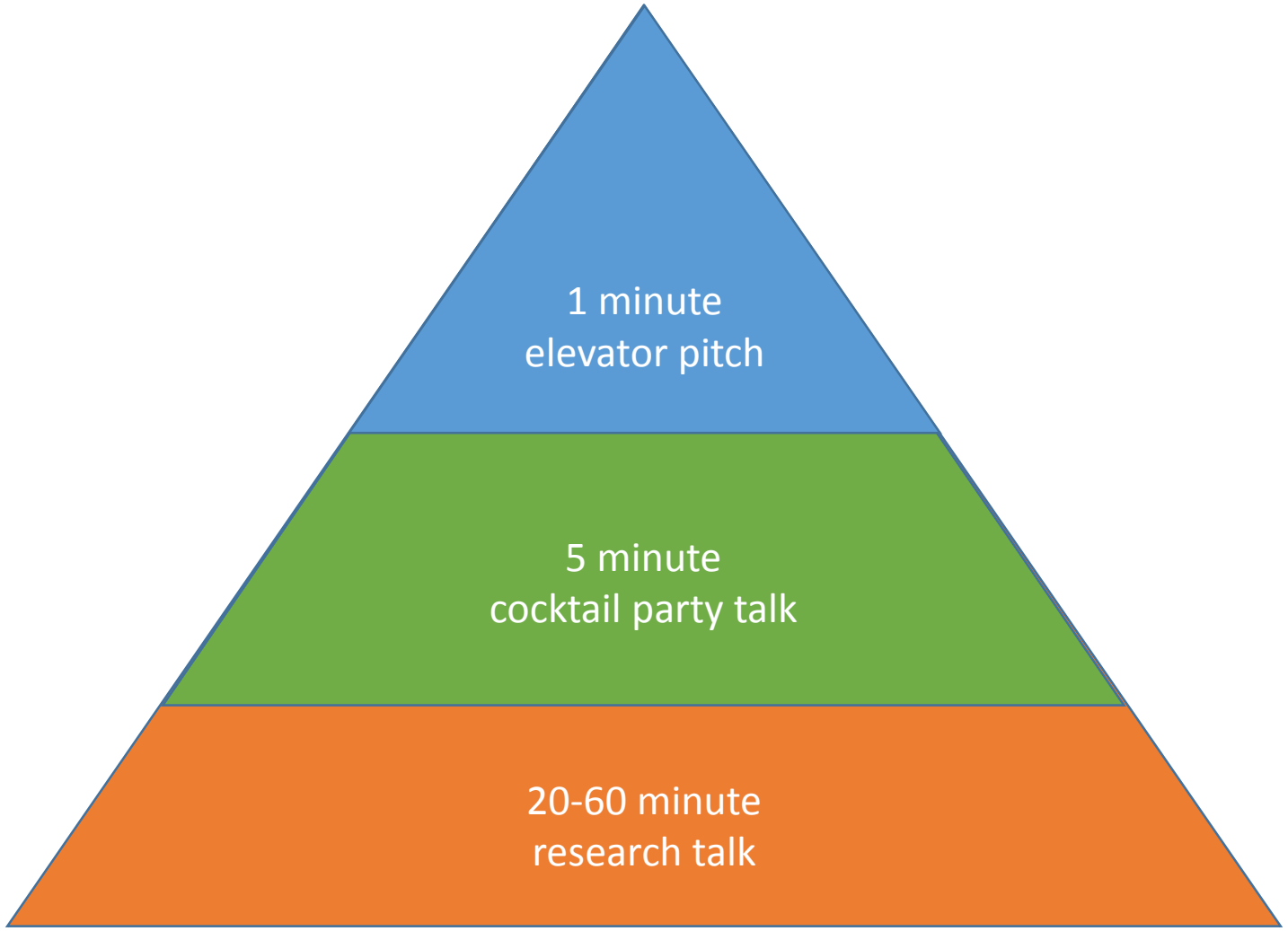
- The publishing process is noisy; sometimes your work will be rejected due to bad luck.
- But, the more you practice the luckier you will be.
- So practice.

- And do not leave it to the last minute.





Research Talks


1 minute
elevator pitch
5 minute
cocktail party talk
20-60 minute
research talk

[Lucia Dettori, 2007]

Purpose of a Research Talk

Is **not** to

- Impress the audience
- Tell them all you know about a subject
- Present every little detail of your work

It **is** to

- Give the audience a sense of what your idea/work is about
- Make them want to read your paper (or even start a collaboration)
- Get critical feedback on your work

[Jones et al., 1993]

What to Say

- See your talk as an advertisement for your work, rather than an in-depth treatment (usually)
- Ask, who is my primary audience?
- If someone remembers only one thing from my talk, what would I like it to be?
  - **Make sure you tell the audience this thing**
- Use examples
  - When you give a definition of a property, or a mathematical structure, or some new notation, give examples to show what the definition captures (and what it does not).
  - When you give a theorem, give examples to show what it means in practice.
- Say enough to convey the essence of your idea, but don't overwhelm your audience with too much material.
- Adopt a non-uniform approach to your talk; treat some aspects in more detail than others.
- Avoid the temptation to conceal problems you know about in your work. Not only is it dishonest: it is also ineffective. A bright audience will find you out.
  - Furthermore, if you are open about the difficulties, you may find that someone makes a suggestion which turns out to be just what you need. Get your audience to help you do your research!

Visual Aids

- Use powerpoint, keynote, latex
  - know your tools
- Use diagrams more than text
  - Limit use of equations (you are not trying to show how smart you are)
- Limit the use of animations and colours
- When writing slides remember that people can read and take in only very little information
  - Limit to six or seven points on a slide
- Slides shouldn't repeat what you plan to say, but they should emphasise it
  - This may mean you need separate notes to remind you of what you want to say

[Mark Reid, 2013]

Do not fill your slides with lots of text. Keep in mind that it is difficult to read while listening to someone speak. Your audience will either read the text on the slides and ignore what you are saying; or listen to what you are saying and not really read it. Either way, they will miss something unless you read exactly what is on your slides, in which case it is a waste of your simple modes of communication by repeating what you are trying to say on both channels.

[Mark Reid, 2013]

Do not fill your slides with lots of text. Keep in mind that it is difficult to read while listening to someone speak. Your audience will either read the text on the slides and ignore what you are saying; or listen to what you are saying and not really read it. Either way, they will miss something unless you read exactly what is on your slides, in which case it is a waste of your simple modes of communication by repeating what you are trying to say on both channels.

Giving the Talk

- Be enthusiastic. Most people get nervous before giving a talk. Its normal.
  - Remember: the person who just gave that confident, assured presentation before you almost certainly felt just the same.
- Try make eye contact with your audience.
  - Talk to, not at, your audience
- Don’t block your slides by standing in front of the screen.
- Don't over-run. It is selfish and rude.
- With practice you’ll know how long each slide takes. Plan on an average of one slide per minute. Include a couple of places where you can leave out a bunch of slides, and check the time when you get to them.
- It's a good idea to have a couple of break-out slides at the end of your talk.
- Make it clear that you’ve reached the end of your talk.
  - But don’t waste your effort on a content-less “thank you” slide.

Conference Posters

Oral vs. Poster

- Talks are generally considered more prestigious
- But posters offer a more intimate interaction
  - You can really ensure that your ideas are getting across
  - You can make contacts and build your academic network

What is a Poster?

- A poster is …
  - a visual communication tool
  - an advertisement of your work
  - a source of information
  - a summary of your work

- An effective poster helps you engage in conversations with your colleagues

High-Accuracy 3D Sensing for Mobile Manipulators

Morgan Quigley, Siddharth Batra, Stephen Gould, Ellen Klingbiel, Quoc Le, Andrew Y. Ng

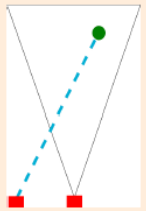
1 Overview

- High accuracy 3D information on robotic platforms significantly improves object detection and manipulation tasks.
- We developed a milli-meter accuracy laser line scanner capable of performing full scene scanning in 3-5 seconds.
- We demonstrate how data from our scanner can greatly improve detection of common office objects (coffee mugs, disposable cups, and staplers) and help with mobile manipulation such as door opening.
- Finally, we put all these components together with navigation in a single platform to perform an inventory taking demonstration.

- Our work is part of the ongoing **STAIR** (STanford Artificial Intelligence Robot) project which has the long-term goal of integrating techniques from all areas of AI to build a useful home/office assistant robot.

2 3D Triangulation Imaging

- Vertical laser line directed into the scene
- Image differencing on a horizontally-offset camera detects the line which is deformed by the depth variations of the scene
- On each scanline of the image, the centroid of the laser line is detected and used to define a ray from the camera origin into the scene



- Intersection of the image ray with the plane defined by the vertical laser line provides the 3D coordinate of the pixel
- Laser is rotated to provide full coverage of the scene

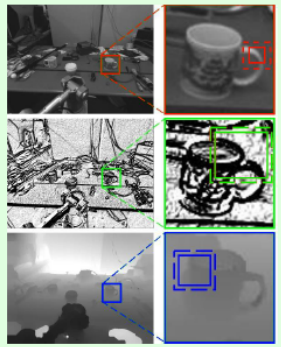
3 Three "Image" Channels

- Depth at every pixel can be thought of as an additional image channel

intensity edge map depth

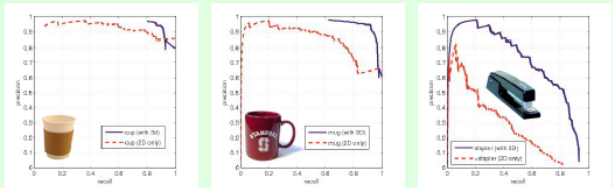
4 Multi-Channel Patch-based Object Detection

- Build on the sliding-based object detector paradigm
- Learn a "patch" dictionary over intensity, edge, and depth patches
- Depth patches capture shape profile; intensity and edge patches capture appearance
- Patch "responses" combined in a boosted decision-tree classifier



5 Object Detection Results

- 150 images of cluttered office scenes
- Results show average five-fold cross-validation performance



6 Door Opening

- Robot needs to manipulate door handle without colliding with the door
- Requires less than a couple of centimeter positioning error

- Uses laser scanner to locate handle; manipulator then moves towards handle and applies pressure to unlatch it; robot then drives through pushing the door open

7 Inventory Taking

- Integrates object detection, door opening and navigation
- Robot instructed to take inventory of all mugs in four different offices
- Multi-channel detector finds 24 out of 26 mugs with no false-positives (cf. image-only detector which finds 15 mugs and 19 false-positives)
- All four office doors opened successfully

8 Discussion and Future Work

- High-accuracy 3D scanning helps robotic manipulation and object detection
- We plan to build faster scanners and improve our object detection algorithms

We thank Ashley Wellman and Aaron Rosekind for assistance with the hardware, and Brian P. Gerkey who helped with the navigation component of our experiments.

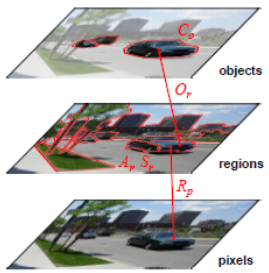
Region-based Segmentation and Object Detection

Stephen Gould, Tianshi Gao and Daphne Koller

1 Overview

- **In this work, we present a coherent probabilistic model for holistic scene understanding that simultaneously reasons about foreground objects and background regions.**
- Holistic scene understanding aims to perform joint inference over a number of computer vision tasks (e.g., joint object detection and image segmentation).
- However, most recent approaches (e.g., [2, 3]) use separate representations for each task making joint inference clumsy and leaving the classification of many parts of the scene ambiguous.
- **Our approach defines a unified description of the scene --- importantly, we explain *every pixel* in the image and enforce global consistency between vision tasks.**
- Our modular energy function can be easily analyzed and improved as new computer vision technologies become available.
- Experiments on the Street Scenes dataset [7] show significant improvement over state-of-the-art.

2 Hierarchical Region-based Model



- Features and random variables are associated with pixels, regions and objects, and linked via a coherent energy function.
- Regions, which are semantically and geometrically consistent, are composed of pixels; objects are composed of (one or more) regions.

[1] S. Gould, R. Fulton, and D. Koller. Decomposing a scene into geometric and semantically consistent regions. *ICCV 2009.*
[2] G. Heitz, S. Gould, A. Saxena, and D. Koller. Cascaded classification models: Combining models for holistic scene understanding. *NIPS 2008.*
[3] D. Hoiem, A. A. Efros, and M. Hebert. Closing the loop on scene interpretation. *CVPR 2008.*
[4] C. Wojek and B. Schiele. A dynamic conditional random field model for joint labeling of object and scene classes. *ECCV 2008.*
[5] Z. Tu, X. Chen, A. L. Yuille, and S.-C. Zhu. Image parsing: Unifying segmentation, detection, and recognition. *ICCV 2003.*
[6] L.-J. Li, R. Socher, and L. Fei-Fei. Towards Total Scene Understanding. *CVPR 2009.*
[7] S. Bileschi and L. Wolf. A unified system for object detection, texture recognition, and context analysis based on the standard model feature set. *BMVC, 2005.*

3 Energy Function

Horizon Term
e.g., vanishing lines

Region Term
e.g., consistent appearance and location

Boundary Term
e.g., difference in color/texture between regions

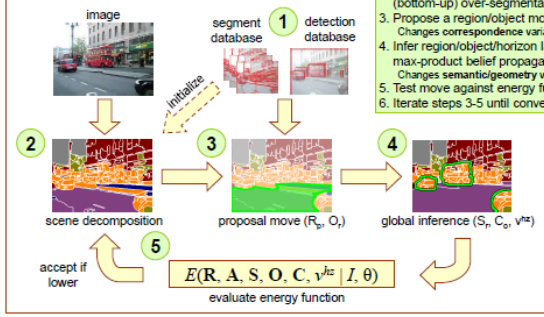
Object Term
e.g. wheel-like appearance in bottom corner

Context Term
e.g., cars on road

4 Object Detectors

- Refine classification of (one or more) foreground regions.
- Simple appearance (color/texture) features are enough for background regions, but good object detection performance requires localized appearance and shape features.
- We demonstrate two methods for adapting state-of-the-art object detectors so that they can be used in our model:
  - **Black-box:** Naively place bounding-box around pixels to be classified. Used score from standard sliding-window detector.
  - **Masked:** Mask out pixels not belonging to proposed object and extract features from masked window.

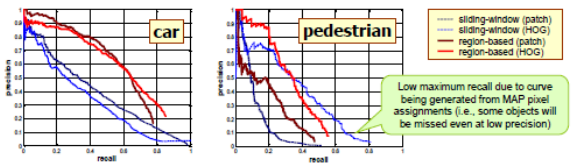
5 Inference Algorithm



1. Create proposal-move dictionaries
   region moves: multiple over-segmentations
   object moves: sliding-window detections
2. Initialize scene from an unsupervised (bottom-up) over-segmentation algorithm
3. Propose a region/object move
   Changes **correspondence** variables
4. Infer region/object/horizon labels using max-product belief propagation
   Changes **semantic/geometry** variables
5. Test move against energy function
6. Iterate steps 3-5 until convergence

6 Experimental Results

- Evaluated on Street Scenes dataset [7]
  - 710-image test set contained 1183 cars (avg. size: 86x48) and 293 pedestrians (avg. size: 22x49 cf. min. size for HOG: 64x128)



7 Conclusion

- Our coherent representation of objects and regions in a scene provides a principled basis for holistic scene understanding and can easily be extended to include other computer vision tasks such as 3d reasoning and scene categorization.

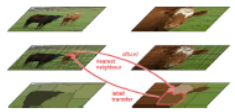
Superpixel Graph Label Transfer with Learned Distance Metric

Stephen Gould, Jiecheng Zhao, Xuming He, Yuhang Zhang
Research School of Computer Science, ANU
Australian National University

ECCV '14 Zürich, September 6-12th, 2014

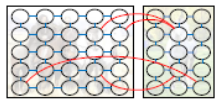
1 Overview

- This work addresses the problem of semantic segmentation by transferring labels from an annotated corpus to the image under test.
- We represent an image as a set of superpixels at multiple scales.
- We present **a fast move-making algorithm** for finding nearest neighbours that takes into account image structure.
- Our method also incorporates a **metric learning** step so that distance in feature space better reflects semantic similarity.
- Results are reported on four popular datasets and code is provided online.



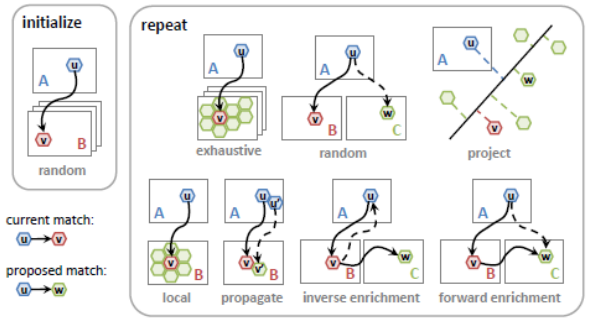
2 Finding Nearest Neighbours

- We construct a graph where **nodes** represent superpixels and (directed) **edges** represent matches.
- Edges are weighted by the distance between superpixels in feature space.
- Our goal is to find the **lowest cost** set of edges (i.e., k nearest neighbours) for each node:



$$\begin{array}{lll} \text{minimize (over } \mathcal{E}) & \sum_{(u,v)\in\mathcal{E}} d_M(u,v) & \\ \text{subject to} & \mathbf{deg}(u) = k & \forall u \in \mathcal{V} \\ & \mathbf{img}(u) \neq \mathbf{img}(v) & \forall (u,v) \in \mathcal{E} \\ & \mathbf{img}(v) \neq \mathbf{img}(w) & \forall (u,v),(u,w) \in \mathcal{E} \end{array}$$

- We disallow edges between nodes from the same image and only allow a node to match to at most one node from each other image.
- The problem is solved approximately via a move making algorithm:



3 Metric Learning

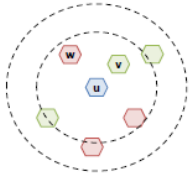
- We want a distance metric that puts semantically similar superpixels closer than semantically different ones.

Semantic (Label Space):

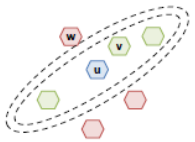
$$d^Y(\text{horse}, \text{horse}) < d^Y(\text{horse}, \text{goat})$$

Appearance:

$$d^X(\text{horse}, \text{horse}) \overset{?}{\gtrless} d^X(\text{horse}, \text{goat})$$



$$d_I(u,v) = \|\boldsymbol{x}_u - \boldsymbol{x}_v\|^2$$



$$d_M(u,v) = (\boldsymbol{x}_u - \boldsymbol{x}_v)^T M (\boldsymbol{x}_u - \boldsymbol{x}_v)$$

- To do this we learn a generalized distance metric using a modified large margin nearest neighbour (LMNN) approach:

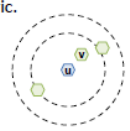
$$\begin{array}{lll} \text{minimize (over } M, \xi \succeq 0) & \sum_{uvw} \xi_{uvw} + \sum_{(u,v)\in\mathcal{E}^+} d_M(u,v) & \\ \text{subject to} & d_M(u,w) - d_M(u,v) \geq 1 - \xi_{uvw} & \\ & \forall u \in \mathcal{V}, v \in \mathcal{N}_u^+, w \in \mathcal{N}_u^- & \end{array}$$

(u v w) = superpixel-target-imposter triplet

4 Finding Targets and Imposters

- Target and imposter nearest neighbours can be found using our move making algorithm by modifying the distance metric.

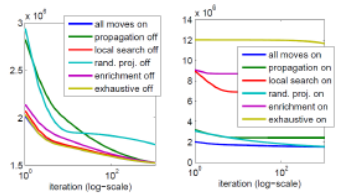
$$d_M^+(u,v) = \begin{cases} d_M(u,v) & \text{if } y_u = y_v \\ \infty & \text{otherwise} \end{cases}$$



$$d_M^-(u,v) = \begin{cases} d_M(u,v) & \text{if } y_u \neq y_v \\ \infty & \text{otherwise} \end{cases}$$

5 Experimental Results

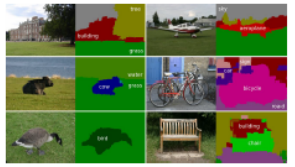
- Search move efficacy is evaluated by optimising the objective with all-but-one and only-one strategies.
- We also evaluate semantic labelling accuracy. Labels are transferred per-pixel.



	Euclidean	Mahal.	Learned	FLANN	PMG	S of the A
Polo	86.1 (71.0)	89.4 (80.1)	91.8 (85.9)	91.7 (85.8)	94.2 (91.7)	94.2 (91.7)
MSRC	74.3 (61.4)	79.6 (68.2)	84.5 (73.8)	82.3 (70.4)	79.0 (72.8)	87.0 (78.0)
Stanford	74.8 (64.4)	76.2 (66.0)	79.3 (69.4)	78.8 (69.1)	73.4 (62.0)	82.9 (74.5)
SIFT Flow	74.5 (21.6)	75.9 (22.7)	78.4 (25.7)	77.5 (24.2)	65.2 (14.9)	78.6 (39.2)

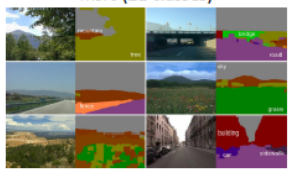
Performance is reported as global pixelwise accuracy. Class-averaged accuracy shown in parentheses. **Euclidean:** Euclidean distance on raw features. **Mahal.:** Diagonal Mahalanobis distance. **Learned:** Distance metric learned via modified LMNN (Weinberger and Saul, JMLR 2009) algorithm. **FLANN:** Same learned distance metric; search algorithm replaced with FLANN (Muja and Lowe, VISSAPP 2009). **PMG:** Results from the Gould and Zhang (ECCV, 2014). **S of the A:** State of the art results reported in the literature for each dataset.

polo (6 classes)



msrc (21 classes)

stanford background (9 classes)



sift flow (23 classes)

6 Code Available

1. Install the **Darwin** software framework
   http://drwn.anu.edu.au
2. Download and prepare a dataset
3. Run the `nnGraphPipeline.py` Python script

PIGS IN SPACE: EFFECT OF ZERO GRAVITY AND AD LIBITUM FEEDING ON WEIGHT GAIN IN CAVIA PORCELLUS

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ABSTRACT:

One ignored benefit of space travel is a potential elimination of obesity, a chronic problem for a growing majority in many parts of the world. In theory, when an individual is in a condition of zero gravity, weight is eliminated. Indeed, in space one could conceivably follow ad libitum feeding and never even gain an gram, and the only side effect would be the need to upgrade one's stretchy pants("exercise pants"). But because many diet schemes start as very good theories only to be found to be rather harmful, we tested our predictions with a long-term experiment in a colony of Guinea pigs (Cavia porcellus) maintained on the International Space Station. Individuals were housed separately and given unlimited amounts of high-calorie food pellets. Fresh fruits and vegetables were not available in space so were not offered. Every 30 days, each Guinea pig was weighed. After 5 years, we found that individuals, on average, weighed nothing. In addition to weighing nothing, no weight appeared to be gained over the duration of the protocol. If space continues to be gravity-free, and we believe that assumption is sound, we believe that sending the overweight — and those at risk for overweight — to space would be a lasting cure.

INTRODUCTION:

The current obesity epidemic started in the early 1960s with the invention and proliferation of elastane and related stretchy fibers, which released wearers from the rigid constraints of clothes and permitted monthly weight gain without the need to buy new outfits. Indeed, exercise today for hundreds of million people involve only the act of wearing stretchy pants in public, presumably because the constrictive pressure forces fat molecules to adopt a more compact tertiary structure (Xavier 1965).

Luckily, at the same time that fabrics became stretchy, the race to the moon between the United States and Russia yielded a useful fact: gravity in outer space is minimal to nonexistent. When gravity is zero, objects cease to have weight. Indeed, early astronauts and cosmonauts had to secure themselves to their ships with seat belts and sticky boots. The potential application to weight loss was noted immediately, but at the time travel to space was prohibitively expensive and thus the issue was not seriously pursued. Now, however, multiple companies are developing cheap extra-orbital travel options for normal consumers, and potential travelers are also creating news ways to pay for products and services that they cannot actually afford. Together, these factors open the possibility that moving to space could cure overweight syndrome quickly and permanently for a large number of humans.

We studied this potential by following weight gain in Guinea pigs, known on Earth as fond of ad libitum feeding. Guinea pigs were long envisioned to be the "Guinea pigs" of space research, too, so they seemed like the obvious choice. Studies on humans are of course desirable, but we feel this current study will be critical in acquiring the attention of granting agencies.

MATERIALS AND METHODS:

One hundred male and one hundred female Guinea pigs (Cavia porcellus) were transported to the International Space Laboratory in 2010. Each pig was housed separately and deprived of exercise wheels and fresh fruits and vegetables for 48 months. Each month, pigs were individually weighed by duct-taping them to an electronic balance sensitive to 0.0001 grams. Back on Earth, an identical cohort was similarly maintained and weighed. Data was analyzed by statistics.

RESULTS:

Mean weight of pigs in space was 0.0000 +/- 0.0002 g. Some individuals weighed less than zero, some more, but these variations were due to reaction to the duct tape, we believe, which caused them to be alarmed push briefly against the force plate in the balance. Individuals on the Earth, the control cohort, gained about 240 g/month ($p = 0.0002$). Males and females gained a similar amount of weight on Earth (no main of effect of sex), and size at any point during the study was related to starting size (which was used as a covariate in the ANCOVA). Both Earth and space pigs developed substantial dewlaps (double chins) and were lethargic at the conclusion of the study.

CONCLUSIONS:

Our view that weight and weight gain would be zero in space was confirmed. Although we have not replicated this experiment on larger animals or primates, we are confident that our result would be mirrored in other model organisms. We are currently in the process of obtaining necessary human trial permissions, and should have our planned experiment initiated within 80 years, pending expedited review by local and Federal IRBs.

ACKNOWLEDGEMENTS:

I am grateful for generous support from the National Research Foundation, Black Hole Diet Plans, and the High Fructose Sugar Association. Transport flights were funded by SPACE-EXES, the consortium of wives divorced from insanely wealthy space-flight startups. I am also grateful for comments on early drafts by Mañana Athletic Club, Corpus Christi, USA. Finally, sincere thanks to the Cuy Foundation for generously donating animal care after the conclusion of the study.

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Barriers, enablers and related strategies in relation to supported post-secondary education for people with mental health challenges: a pilot organizational case study*

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Abstract

Objective: In this project, we searched for enablers and barriers of successful completion of a college education for persons with mental health challenges. **Methods**: We examined relevant available documents published or posted by the college, including college policies, information web sites, minutes of committee meetings and college brochures, and we documented the references in these documents to issues related to students with mental health challenges. We also conducted individual semi-structured interviews with administrators, faculty, support staff, and counsellors from the college, asking them to identify and elaborate on such enablers, barriers and related strategies to facilitate supported education. **Results**: The college has addressed the requirements of the Ontario Human Rights Code by developing structures and processes which appear to meet the college's responsibility to provide appropriate educational accommodations for students with disabilities. However, these structures and processes depend on disabled students being proactive in their search for educational accommodations for their disabilities, which may act as a subtle and invisible barrier for many students with mental health challenges. **Conclusion**: Further research on supported education for persons with mental health challenges is required.

Introduction

1. Psychiatric symptoms are reported by 5-12% of the college student population (Megivern et al., 2003).
2. Anecdotal evidence suggests that the dropout rate for students with psychiatric concerns is even higher than the 60% dropout rate of other high-risk students (Fanshawe College 2008).
3. Students with mental health challenges may face personal, environmental, and system barriers at the college, which may contribute to their increased risk of dropout (Loewen, 1993).
4. Supported post-secondary education (Collins et al., 1998) may prevent such students from withdrawing from college, but is highly underused (Megivern et al., 2003).
5. Although there have been some promising studies regarding supported post-secondary education outside of Canada (e.g., Dunn et al., 2008; Mowbray et al., 1999), generalization from these findings to the Canadian context may be problematic.
6. With a better understanding of barriers and enablers of supported education of College students with mental health challenges, various departments at the college may be able to improve their services to students with mental health challenges. The result could be a lower dropout rate and later on a higher employment rate for students with mental health challenges. More immediately, the result could be more satisfaction on the part of students with mental health challenges and others involved.

Objective and Questions

We aimed to study barriers, enablers and related strategies in relation to supported post-secondary education of people with mental health challenges in a Canadian College (Fanshawe College in London, Ontario). These three components of the study objective – what are **barriers**, what are **enablers** and what are **suggested strategies** – composed the three main research questions.

Methods

1. Design and setting: Cross-sectional organizational case study (Yin, 2008), using semi-structured interviews with Fanshawe College employees and document review.
2. Sample: A purposive sample of 13 College employees were interviewed, consisting of teachers, counsellors, administrators, and support staff. Sample size for the interviews was determined according to relevant published norms for qualitative data saturation (Morse, 2000). All relevant available College and related documents were reviewed.
3. Instruments and data collection: The interviews were based on an interview guide created by the investigators, and were conducted by a trained and supervised research assistant. Documents were reviewed by the principal investigator based on a document review guide created by the investigators.
4. Analysis: Comparative thematic analysis (Boyatzis, 1998) was conducted on the data. Credibility was established by triangulation of data collection methods and of information sources (interviews and document review) and by peer debriefing among the investigators.
5. Ethics: The ethics review boards of both Fanshawe College and the University of Western Ontario approved this project, and written voluntary informed consent was obtained from the participants (interviewed employees). Review of documents that were not in the public domain was approved by Fanshawe College's administration.

Results: Review of Documents

1. Official Policy Regarding Students with Disabilities

Policy 2-A-09 is the college's response to the requirement of the Ontario Human Rights Code, specifically the requirement that all individuals, regardless of disability, have the right to an accessible education. Persons with mental illness are considered to have a disability covered by Policy 2-A-09 and the college states its commitment to providing appropriate accommodation for these students. In Policy 2-A-09, an accommodation is considered appropriate if "it will provide an equal opportunity to attain the same level of performance, or to enjoy the same level of educational benefits experienced by others." (Section 2.2) This policy, although generic, may be considered an **enabler**.

2. Direct Evidence from Other Documents

We examined dozens of documents, including college policies, information on the Fanshawe College website, minutes of meetings from various committees, and a range of brochures published by the college. In all of that material, the term "mental illness" was used only a few times. In each instance there was an almost identical reference to mental illness as a non-visible disability. Such relative dearth of direct reference to mental health challenges may be considered a **barrier**.

3. Indirect Evidence from Other Documents

We reviewed indirect evidence, i.e., how the response of the college to students with mental health related disabilities compares to the college's response to students with other types of disabilities. It is common in all the material which we examined to group together all students with disabilities. This is particularly true when talking about accommodations, many of which have a generic applicability to many types of students and learning styles.

In many instances, this generic approach to disability is an **enabler**. The Course Registration Guarantee for a Student with a Disability form illustrates the usefulness of such a generic approach. Students who meet the entrance requirements of the program and who need to take a part-time course load because of their disability are guaranteed a place in a program by means of this policy. This is an excellent example of a process which acts as a enabler for all students with disabilities, not only those with mental health challenges. Other examples of generic enablers include access to the Bursary for Students with Disabilities for those who meet the financial guidelines, use of extended time on tests, access to free tutoring services, and access to the computer laboratory.

Yet, it appears that many accommodations clearly benefit some sub-groups of students more than others. For example, in the Accessibility Plan (September 2009), there is a focus on the accessibility of the physical facilities, such as a rest area for students with medical/chronic pain issues and private voice-to-print study rooms. Within the report, there is also a description of accommodations designed for particular target groups: technology purchases for apprentices with disabilities, transitions workshops for Grade 11 students with learning disabilities, an audit of services of ASL contracted interpreters, transitions workshops for students sponsored by WSIB, instructional videos for Apprentices, and a research project focusing on employment for students with mental health challenges. Thus, for some purposed, the generic approach to disability is also a **barrier**.

Also, the information outlining the availability of accommodations may be missed by some students, which can be a **barrier**.

Results: Interviews with College Employees

Barriers:

1. Lack of awareness and of knowledge of Disability Support Services (DSS) before students begin their schooling.
2. Obscure location of information about DSS in the application package.
3. Inadequate counselling prior to choosing a program, sometimes leading to a mismatch between student abilities and the required abilities for the program.
4. Lack of student self-awareness of the need for support services.
5. Reluctance by the student in disclosing disabilities to the DSS or disclosing them too late in the course.
6. Stigmatizing attitudes by peers, by staff and by the students themselves in relation to individuals with psychiatric disabilities; and the belief of some faculty that accommodations are an advantage rather than a compensatory strategy.
7. Fatigue from past failures in the use of DSS inside and outside the college.
8. Compounding effects of one or more additional physical disabilities.
9. Active psychiatric symptoms and side-effects of medications.
10. Lack of designated study space at home, financial burden, and other unmet basic needs, such as safe housing and food.
11. Absence of mandatory confidential communication between DSS and the faculty member regarding the student's disability and accommodations required.
12. Lack of flexibility in completing a course over an extended time period, due to effect on government financial assistance.
13. College emphasis on meeting attendance criteria, which can be challenging for some individuals with psychiatric disabilities e.g., poor motivation or sedation as side-effect of medication.
14. Financial and resource constraints in the college, e.g., insufficient numbers of student success advisors.

Enablers:

1. Presence of (formal or informal) supports prior to college entry.
2. Tours of the college prior to start-date and a single point of contact for all information in the college.
3. Internal student characteristics such as extroversion, assertiveness, active help-seeking and sociability.
4. Peers, i.e., being part of a study-group, acquaintance with other students who have experience with mental illness, on and off-campus peer support groups, and peer tutors.
5. Family and friends as key off-campus supports, particularly in relation to making decisions about course-load and other academic commitments. However, such natural supports were thought to be challenging to access for those students whose hometown is not London.
6. Active interventions by the DSS when the student's academic progress is in crisis, e.g., advocacy and negotiations.
7. Presence of multiple campus-based supports such as the library service, helpdesk for computer-related issues, the learning centre, taxi chits to transport students to emergency room if needed, and emergency funds and bursaries to facilitate accommodations.
8. The availability of accommodations, both inside the college and during field placements, through the DSS office.
9. The student success plan, a learning plan created by the student with the DSS counsellor and the student success advisor.
10. Group teaching sessions by the DSS on certain psychiatric disabilities for employees of the college.
11. Availability of online courses and the posting of tutorial notes online as potentially helpful strategies for students with psychiatric disabilities, although level of technological savvy required and/or cognitive challenges may deter some individuals from pursuing them successfully.
12. Excellent working relationship with outside agencies focussed on rehabilitation and employment.

Suggested strategies:

1. Reduction in the student-teacher ratio and reducing the use of large-group teaching.
2. A greater emphasis on pedagogy and continuing professional development.
3. Planned computerized system to ensure follow-up of students who attend the disability support services office.
4. A certificate of achievement of specific skills for non-completers to help demonstrate job-readiness.
5. An automatic confidential disclosure directly by disability support services to the faculty and a computerized system to remind faculty of the students who need accommodations prior to tests and assignments.
6. More flexibility regarding definition of full-time studentship.

Discussion and Conclusion

1. An enabler is that Policy 2-A-09 provides an appropriate framework that meets the college's responsibility for providing accessible education to students with disabilities.
2. A central barrier is that students may not be sufficiently aware of the disability-specific support services which are available to them in the college. This may not be sufficient for individuals with mental health challenges, who often do not follow the traditional educational progression, who do not have an established community support network, or who may have a learning disability or other cognitive impairment that may pose difficulty with this type of information provision.
3. Another central barrier is that, currently, the Disability Services are reactive, as the student must self-refer to them, must provide the appropriate documentation, must arrange to meet with the counsellor, and must have the ability to maintain that contact. Furthermore, any help related to his or her disability only becomes systematically available after the individual has been accepted into the college.
4. Yet another potential barrier is that students with mental health related disabilities are not as clearly identified for accommodation as are students with other types of disabilities.
5. The needs for educational accommodations of students with mental health challenges may be more difficult to satisfy than those of students with other types of disabilities. Like students with other forms of disabilities, students with mental health challenges may need exam accommodations in the form of extended times or distraction-reduced settings, as people with mental illness they may also need flexibility in terms of course completion dates, greater pre-admission counselling, more proactive and ongoing direct intervention by the disability counsellors, and more wrap-around services in collaboration with community agencies.
6. Additional enablers and barriers were found, starting in the period prior to the enrolment process and up to exit from the college. These include factors related to the student's personal characteristics, the different disabilities experienced, and the services and on-campus and off-campus supports available to students.
7. Suggested strategies to enhance supported education for students with mental health challenges included enhancement of current strategies, such as increasing the number of student success advisors; introduction of new strategies, such as implementation of automated confidential disclosure (which would require ethical deliberation); and policy change, such as more flexibility regarding definition of full-time studentship.
8. Our study is limited, partly because it has a relatively small sample size, partly because it is cross-sectional, and partly because it examined only one organization. Still, its findings are suggestive.
9. Our findings point to a variety of barriers, enablers and related strategies that, if addressed, may enhance supported education for students with mental health challenges and, following that, could improve outcomes for these students.
10. Further research on supported post-secondary education for people with mental health challenges is required. As part of that, our group is studying combining supported post-secondary education with supported employment for individuals with mental health challenges, in order to try to improve vocational outcomes for this population.

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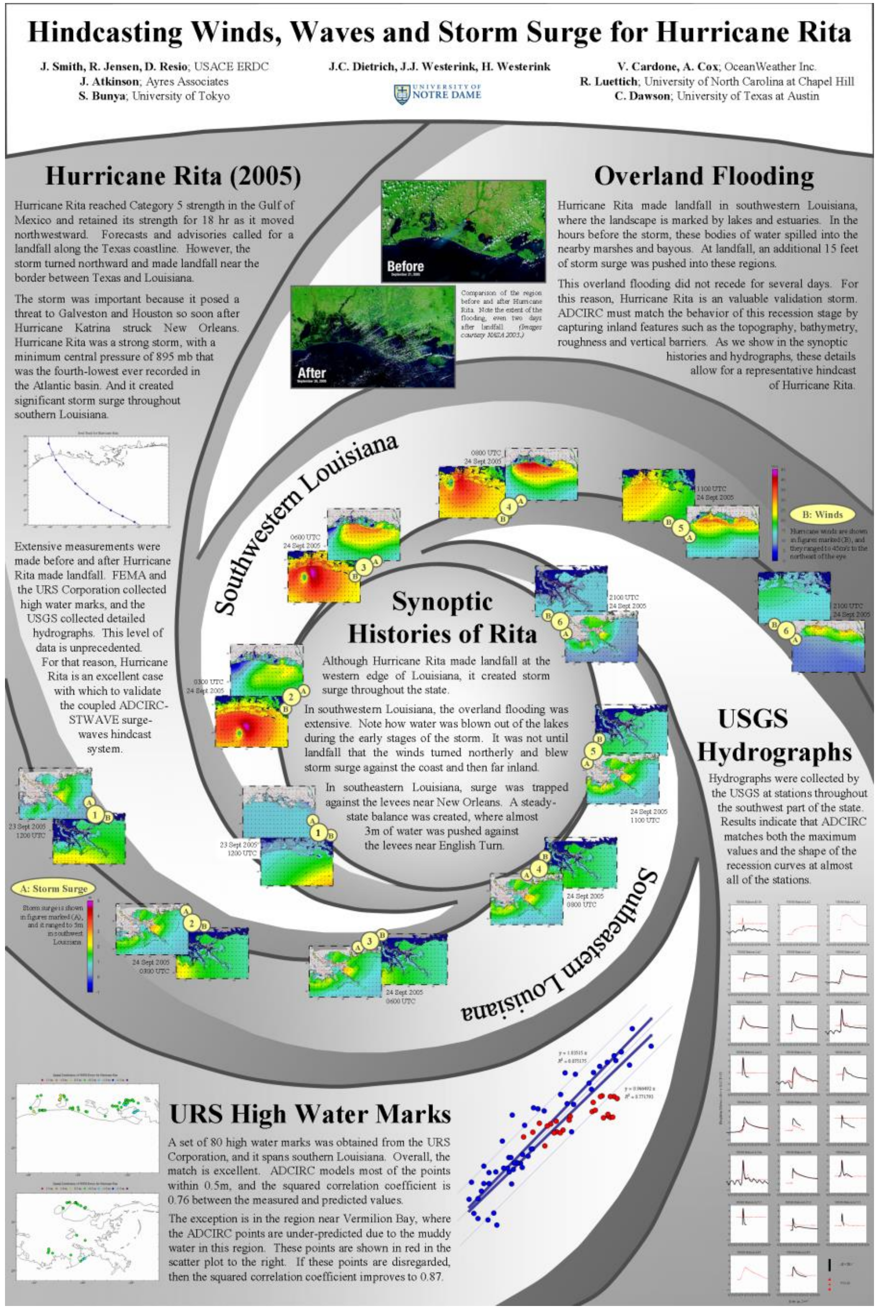
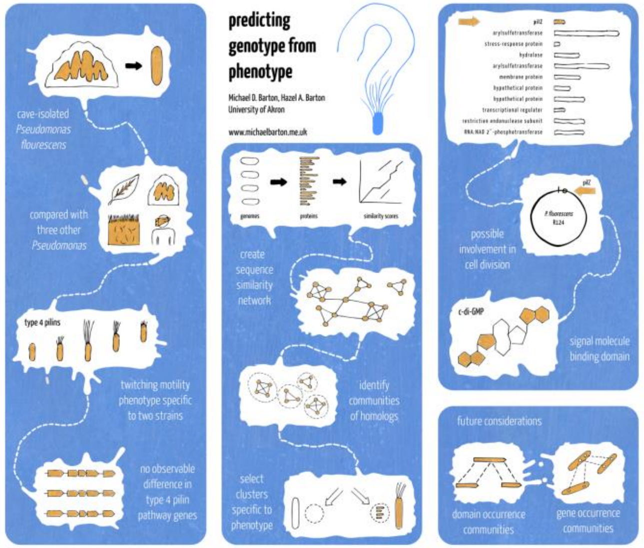
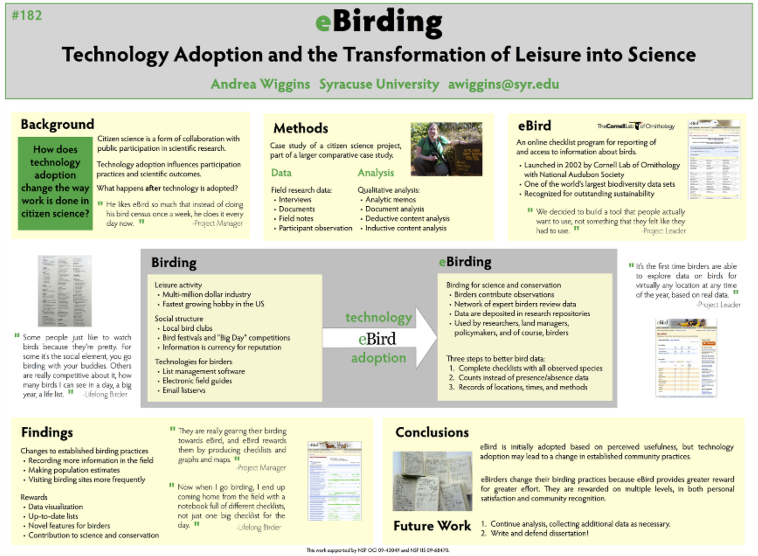
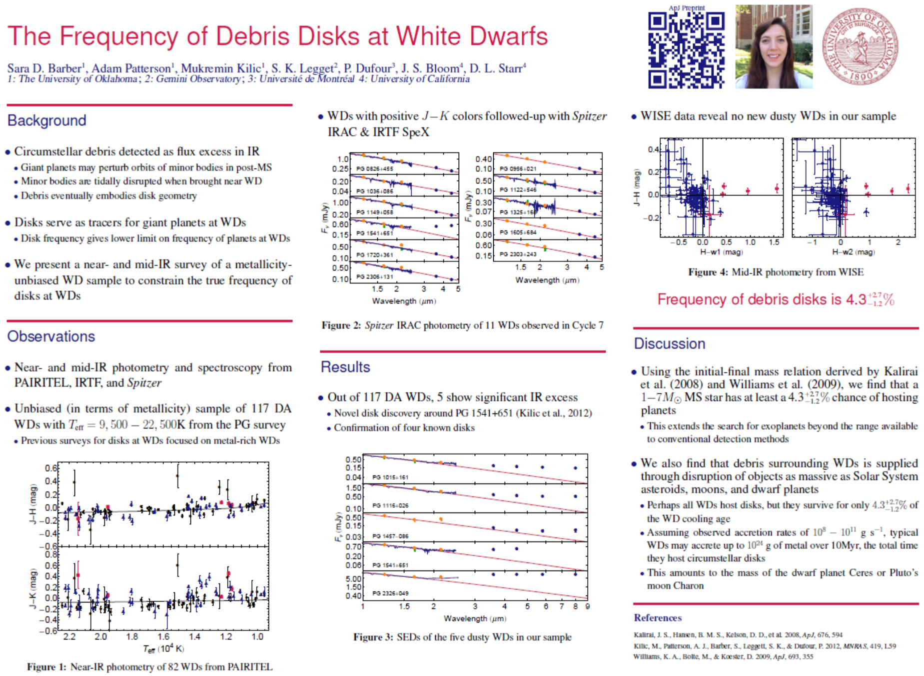
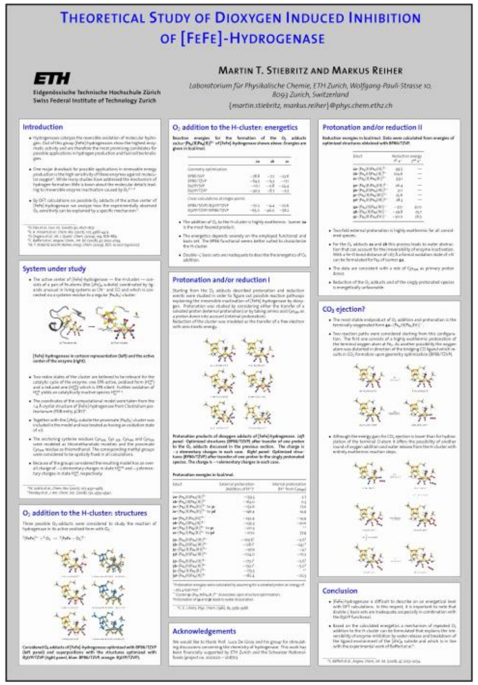
* This study was funded by Fanshawe College.


Hindcasting Winds, Waves and Storm Surge for Hurricane Rita
J. Smith, R. Jensen, D. Resio; USACE ERDC
J. Atkinson; Ayres Associates
S. Bunya; University of Tokyo
J.C. Dietrich, J.J. Westerink, H. Westerink
UNIVERSITY OF NOTRE DAME
V. Cardone, A. Cox; OceanWeather Inc.
R. Luettich; University of North Carolina at Chapel Hill
C. Dawson; University of Texas at Austin
Hurricane Rita (2005)
Hurricane Rita reached Category 5 strength in the Gulf of Mexico and retained its strength for 18 hr as it moved northwestward. Forecasts and advisories called for a landfall along the Texas coastline. However, the storm turned northward and made landfall near the border between Texas and Louisiana.
The storm was important because it posed a threat to Galveston and Houston so soon after Hurricane Katrina struck New Orleans. Hurricane Rita was a strong storm, with a minimum central pressure of 895 mb that was the fourth-lowest ever recorded in the Atlantic basin. And it created significant storm surge throughout southern Louisiana.
Overland Flooding
Hurricane Rita made landfall in southwestern Louisiana, where the landscape is marked by lakes and estuaries. In the hours before the storm, flood waters spilled into the nearby marshes and bayous. At landfall, an additional 15 feet of storm surge was pushed into these regions.
This overland flood did not recede for several days. For this reason, Hurricane Rita is an valuable validation storm. ADCIRC must match the behavior of this recession stage by capturing relevant features such as the topography, bathymetry, roughness and vertical barriers. As we show in the synoptic histories and hydrographs, these details allow for a representative hindcast of Hurricane Rita.
Before
After
Southwestern Louisiana
Synoptic Histories of Rita
Although Hurricane Rita made landfall at the western edge of Louisiana, it created storm surge throughout the state.
In southwestern Louisiana, the overland flooding was extensive. Note how water was blown out of the lakes during the early stages of the storm. It was not until landfall that the winds turned northerly and blew storm surge against the coast and then far inland.
In southeastern Louisiana, surge was trapped against the levees near New Orleans. A steady-state balance was created, where almost 3m of water was pushed against the levees near English Turn.
Extensive measurements were made before and after Hurricane Rita made landfall. FEMA and the URS Corporation collected high water marks, and the USGS collected detailed hydrographs. This level of data is unprecedented. For that reason, Hurricane Rita is an excellent case with which to validate the coupled ADCIRC-STWAVE surge-waves hindcast system.
USGS Hydrographs
Hydrographs were collected by the USGS at stations throughout the southwest part of the state. Results indicate that ADCIRC matches both the maximum values and the shape of the recession curves at almost all of the stations.
Southeastern Louisiana
A: Storm Surge
B: Winds
URS High Water Marks
A set of 80 high water marks was obtained from the URS Corporation, and it spans southern Louisiana. Overall, the match is excellent. ADCIRC models most of the points within 0.5m, and the squared correlation coefficient is 0.76 between the measured and predicted values.
The exception is in the region near Vermilion Bay, where the ADCIRC points are under-predicted due to the muddy water in this region. These points are shown in red in the scatter plot to the right. If these points are disregarded, then the squared correlation coefficient improves to 0.87.


predicting genotype from phenotype
Michael D. Barton, Hazel A. Barton
University of Akron
www.michaelbarton.me.uk
cave-isolated Pseudomonas flourescens
compared with three other Pseudomonas
type 4 pilins
twitching motility phenotype specific to two strains
no observable difference in type 4 pilin pathway genes
create sequence similarity network
identify communities of homologs
select clusters specific to phenotype
possible involvement in cell division
signal molecule binding domain
future considerations
domain occurrence communities
gene occurrence communities


#182
eBirding
Technology Adoption and the Transformation of Leisure into Science
Andrea Wiggins Syracuse University awiggins@syr.edu
Background
How does technology adoption change the way work is done in citizen science?
Methods
eBird
Birding
eBirding
technology
eBird
adoption
Findings
Conclusions
Future Work


The Frequency of Debris Disks at White Dwarfs
Sara D. Barber, Adam Patterson, Mukremin Kilic, S. K. Leggett, P. Dufour, J. S. Bloom, D. L. Starr
1: The University of Oklahoma; 2: Gemini Observatory; 3: Université de Montréal 4: University of California
Background
Circumstellar debris detected as flux excess in IR
Disks serve as tracers for giant planets at WDs
We present a near- and mid-IR survey of a metallicity-unbiased WD sample to constrain the true frequency of disks at WDs
Observations
Near- and mid-IR photometry and spectroscopy from PAIRITEL, IRTF, and Spitzer
Unbiased (in terms of metallicity) sample of 117 DA WDs
Figure 1: Near-IR photometry of 82 WDs from PAIRITEL
WDs with positive J−K colors followed-up with Spitzer IRAC & IRTF SpeX
Figure 2: Spitzer IRAC photometry of 11 WDs observed in Cycle 7
Results
Out of 117 DA WDs, 5 show significant IR excess
Figure 3: SEDs of the five dusty WDs in our sample
WISE data reveal no new dusty WDs in our sample
Figure 4: Mid-IR photometry from WISE
Discussion
References


Theoretical Study of Dioxygen Induced Inhibition of [FeFe]-Hydrogenase
ETH
Martin T. Stiebritz and Markus Reiher
Introduction
System under study
Conclusion
Acknowledgements

Tips for Effective Posters

- Think of your poster as a visual abstract
- Keep words to a minimum; use visuals instead
- Organise your poster so that someone can read it without you there
  - Number the sections in the order they should be read
  - Put your poster up as early as you can
- Use font large enough to read from about 2m away
- Use (a small number of) consistent colours and styles
- Label your plots
- Don’t overcrowd your poster --- leave white space
  - Use lists rather than blocks of text
- Don’t use copyrighted images
- Have some hardcopies of your paper on hand
- **Practice and get feedback**

Walking Through Your Poster

- If you have a good poster you will attract a crowd

- People will often ask to be “walked through” your poster
  - Prepare a 3-5 minute elevator pitch of your work
  - Use the graphics on your poster to support your pitch
  - Ask your audience about their background before you start
  - Ask your audience if they want you to go into more details

- Some people hold back; ask if they want you to explain your poster

Conference Posters Final Quiz

What do you do if new people arrive during your walk-through?

(A) finish your presentation for the earlier audience and then start again

(B) start from the beginning for the new arrivals

Final Remarks

Papers, Talks, and Posters

- Tell a story
  - Don’t just recount your work in chronological order
  - Be clear about what it is that you are trying to do
- Know your audience
- Tell your readers what they need to know when they need to know it
- Pay attention to the details
  - And be precise
- Give the good news and the bad news
- **Practice, practice, proofread, practice**