



Reading Group

(WITH PRIZE!)

Stefano Soatto
UCLA, USA

The purpose of this reading group is to foster deeper understanding of the context in which work in Computer Vision lies. All too often, when we venture in a new topic or field, we delegate to Google the task of placing our ideas or work into the proper context of prior related art: Type a few keywords, browse the results, summarily read the top-ranking hits, dutifully cite them, and move on. In fact, experiments show that most people have not even read the papers they cite.

This process can be unstable in two distinct ways, yielding periodic and explosive phenomena. The first is due to people re-inventing, or re-discovering, the same idea under different guises over and over. The second is due to viral dynamics whereby a paper that manages to bubble at the top of the heap gathers more and more attention eventually becoming **the** reference on the topic.

While we should embrace the benefits that Big Data provide us with, it is worth at least once in your educational process to pause and be critical. Trace the roots of an idea back in time, discover the foundations it stands on, formalize it and abstract it to the point where you can recognize different incarnations of the same idea. Peel off the Emperor's clothes and see what is left.

This is obviously not easy to do in the short span of a reading group, especially considering the attraction of the geographical context outside the auditorium. Therefore, we have framed it as a competition, with an incentive in the form of a \$1,000 prize, and ask you to do your homework prior to traveling to Sicily. Your work will be best conducted in the dusty stacks of your academic institution's library. Yes, the one where the books are actually stored.

Below you will find the rules of the game. Enjoy!

Submission

The report about your homework is due on the first day of the school (14/07/2013) and should be sent in PDF or Word format to icvss@dmi.unict.it. Your name, email address and university/organization should be written at the top of your report.



RULES OF ENGAGEMENT

PART A: READ UP

We will start on-line: take the most "popular" papers in the most recent conference in Computer Vision. For the sake of uniformity, we will choose one particular conference (CVPR) and one particular popularity engine (Sciweavers). This is not an endorsement of either, as the exercise could be done with any other.

As of today (April 1, 2013; no joke), the top-10 most downloaded papers at CVPR 2012, according to Sciweavers, are:

- 1) Foreground Detection Using Spatiotemporal Projection Kernels:
http://www.faculty.idc.ac.il/toky/Publications/Conference/ForDetect_cvpr12.pdf
- 2) Contextual Boost for Pedestrian Detection:
<http://www.eecis.udel.edu/~ding/files/cvpr12.pdf>
- 3) A unified framework for event summarization and rare event detection:
http://www.cs.huji.ac.il/~peleg/CVPR2012/data/papers/160_P2A-10.pdf
- 4) Stream-based joint exploration-exploitation active learning:
http://www.eecs.qmul.ac.uk/~ccloy/files/cvpr_2012.pdf
- 5) Branch-and-price global optimization for multi-view multi-object tracking:
<http://www.w3dvt-con2009.org/papers/data/923/LeaPonRosCVPR2012.pdf>

Read up on the following topics:

- 6) Point cloud matching based on 3D self-similarity:
http://graphics.usc.edu/cgit/publications/papers/Jing_PCP2012.pdf
- 7) Locally Orderless Tracking:
<http://www.eng.tau.ac.il/~avidan/papers/LocallyOrderlessTrackingCVPR2012.pdf>
- 8) Jigsaw Puzzles with Pieces of Unknown Orientation:
http://chenlab.ece.cornell.edu/people/Andy/Andy_files/Gallagher_cvpr2012_puzzleAssembly.pdf
- 9) Decentralized particle filter for joint individual-group tracking:
http://www.cs.huji.ac.il/~peleg/CVPR2012/data/papers/238_P2B-37.pdf
- 10) Robust visual tracking using autoregressive hidden Markov Model:
http://www.cs.huji.ac.il/~peleg/CVPR2012/data/papers/248_P2B-47.pdf

Please download them, and pick a subset of them to read.



PART B: READ BACK

To build up a bit of a historic perspective, below are some topics and fields that may (or may not) be pertinent to the paper above. Explore the stack (with help from your favourite search engine), in as many areas as possible.

NOTE: This process may appear daunting. It is. I can guarantee, however, that it will be a worthwhile investment for the long term.

- singularity theory and singular perturbations: starting from the year 1976
- fault detection: starting from 1984
- optimal stopping time: starting from 1984
- value-of-information: starting from 1965
- reproducing kernel hilbert spaces: starting from 1990
- data processing inequality: starting from 1948
- deformable templates: starting from 1993
- large deviations theory: starting from 1984
- sequential decision theory: starting from 1989
- interactive multiple models: starting from 1987

In addition, the following topics can be reviewed using any of a number of recent references, textbooks and surveys

- multi-scale analysis
- bias/variance dilemma
- optimal transport theory
- canonical correlation analysis
- robust statistics
- sufficient excitation
- model selection



PART C: DRAW CONNECTIONS

If you have done your homework, you may start seeing relationships and connections between the topics in B and the papers in A. More importantly, you may begin seeing connections among the papers in A, perhaps recognizing that in some cases they are doing the same thing. The more papers you read in A, and the more topics you learn and explore in B, the more connections you should be able to draw. In some cases, after the analysis you may be able to do synthesis: cast multiple papers in A using the same notation, and view them in a unified manner.

PART D: REPORT ON YOUR FINDINGS

If the exercise worked, you may find yourself excited to have discovered connections that you could not "see" before, and desire sharing them with your fellow students. These could be connections between A and B, or within A, or both. The more "connected" your picture, the more reward you will get. Literally. If you can convince your fellow student that you really dug deep in finding these connections, you (and your team members) will be awarded the Reading Group Prize.

Please submit your report in the form of slides that you intend to present prior to the beginning of the school. Then, be prepared to be called on stage to share your discoveries and convince the audience that you are the one who dug deeper and found the most, and the most convincing, connections.

The audience will then vote, and the reading group coordinator will draw the conclusions.

Submission

The report about your homework is due on the first day of the school (14/07/2013) and should be sent in PDF or Word format to icvss@dmi.unict.it. Your name, email address and university/organization should be written at the top of your report.