Sean Bell

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Summary: 5th year Ph.D. candidate interested in large-scale crowdsourcing, material and object recognition, object detection, and deep learning.

Education

Cornell University — Ithaca, NY
M.Sc., Ph.D. Candidate in Computer Science — *2011 – Present*

- Advisors: Kavita Bala and Noah Snavely
- Cumulative GPA: 3.98 / 4.30

University of Toronto — Toronto, ON, Canada
B.A.Sc., Engineering Science, with Honors — *2007 – 2011*

- Major in Electrical and Computer Engineering
- Cumulative GPA: 3.93 / 4.00

Experience

Cornell University — Ithaca, NY
Graduate Research Assistant — *2011 – Present*

- New ConvNet architectures for visual search across multiple domains
- Algorithms for material recognition and intrinsic images using deep learning and graphical models
- Extensible open-source crowdsourcing platform (OpenSurfaces)
- Multi-view stereo pipeline to reconstruct both geometry and material properties
- Contact: Kavita Bala and Noah Snavely (Advisors) / kb@cs.cornell.edu and snavely@cs.cornell.edu

Microsoft Research — Seattle, WA
Research Intern — *2015 Summer*

- Advanced the state-of-the-art in object detection, using deep learning
- Improved detection results by +8.5 mAP over baseline Fast R-CNN on VOC2007
- Contact: Ross Girshick (ross.girshick@gmail.com) and Larry Zitnick (lzitnick@hotmail.com). Note: Ross and Larry are now both at Facebook AI Research.

University of Toronto — Toronto, ON, Canada
Undergraduate Researcher — *2010 – 2011*

- Automatically detect noun phrases and find inconsistent references between patent claims
- Interactive patent editor that provides syntax highlighting and highlights errors in real time
- Contact: Gerald Penn (Thesis Supervisor) / 416 978 7390 / gpenn@cs.toronto.edu

Hill & Schumacher — Toronto, ON, Canada
Assistant Patent Agent — *2007, 2008, 2009, 2010, 2011 Summers*

- Met with inventors, drafted and reviewed provisional and non-provisional patent applications
- Prepared responses for examiner reports and office actions, performed patent searches for patentability and freedom to operate, assessed infringement and validity
- Designed a database and UI to track clients, deadlines, and patent metadata
- Contact: Nancy Hill & Lynn Schumacher (Firm Partners) / 416 368 1097 / h-s@hill-schumacher.com

Publications

Inside-Outside Net: Detecting Objects in Context with Skip Pooling and Recurrent Neural Networks
Sean Bell, Larry Zitnick, Kavita Bala, Ross Girshick. *Submitted to CVPR 2016.*

- State-of-the-art object detection results on PASCAL and COCO, with the best algorithm on the public VOC 2012 leaderboard (as of 1 Dec 2015).
- New architecture for object detection incorporating skip pooling and recurrent neural networks

Learning Visual Clothing Style with Heterogeneous Dyadic Co-occurrences
Andreas Veit, Balazs Kovacs, Sean Bell, Julian McAuley, Kavita Bala, Serge Belongie. *ICCV 2015.*

- Predict which clothing items are compatible by training a visual style embedding.

Learning Visual Similarity for Product Design with Convolutional Neural Networks
Sean Bell, Kavita Bala. *ACM Transactions on Graphics (SIGGRAPH 2015).*

- Visual search: proposed new architectures for training visual descriptors for images
- Domain adaptation: developed a crowdsourcing pipeline to collect training data for domain adaptation

Material Recognition in the Wild with the Materials in Context Database
Sean Bell*, Paul Upchurch*, Noah Snavely, Kavita Bala. *CVPR 2015. *Equal contribution.*

- Material recognition: full-scene material classification and segmentation using convolutional neural networks (deep learning) and fully-connected conditional random fields
- Dataset: crowdsourced over 2 million material labels in internet photographs with a 3-stage pipeline

Intrinsic Images in the Wild
Sean Bell, Noah Snavely, Kavita Bala. *ACM Transactions on Graphics (SIGGRAPH 2014).*

- Intrinsic images: state-of-the-art algorithm using fully-connected conditional random fields
- Dataset: crowdsourced thousands of images annotated with relative reflectance information, aggregated from millions of responses by modeling each worker's skill and bias
- Benchmark: performance metric for intrinsic images with a focus on real-world images
- Available online: http://intrinsic.cs.cornell.edu/

OpenSurfaces: A Richly Annotated Catalog of Surface Appearance
Sean Bell, Paul Upchurch, Noah Snavely, Kavita Bala. *ACM Transactions on Graphics (SIGGRAPH 2013).*

- Crowdsourcing: implemented a dynamic pipeline of 13 different Mechanical Turk experiments
- Dataset: 100k surfaces annotated with material boundaries, reflectance, material name, surface normal, scene category, and object name
- Available online: http://opensurfaces.cs.cornell.edu/

Other Service

Technical paper reviewer

- SIGGRAPH 2014 Asia
- SIGGRAPH 2015
- CVPR 2015
- CVPR 2016

Teaching Assistant

- TA for computer vision (CS4670/5670, Spring 2015)
  Prepared and presented the deep learning lectures for the course

Awards

NSERC Postgraduate Doctoral Scholarship	2013 – 2016
NSERC Postgraduate Masters Scholarship	2011 – 2012
Constant Temperature Limited Scholarship	2011
Shaw Design Scholarship	2010
AER201 Engineering Design Project, 1st place	2008
University of Toronto Scholar	2008
Hewlett-Packard CodeWars Competition, Advanced Division, 1st place	2005

Skills

Languages: Python, C/C++, Java, Javascript/Coffeescript, HTML5/CSS3/LESS, Bash/Zsh, Matlab
Tools: Django, PostgreSQL, Redis, Celery/RabbitMQ, StarCluster, HDF5, NumPy/SciPy, Git/Mercurial
Platforms: Linux/Unix/Ubuntu, Amazon AWS (EC2 & S3)