

Neeraj Kumar

<http://neerajkumar.org>

CURRENT POSITION

Software Engineer at Dropbox.

EDUCATION

Columbia University

Sep 2005–Aug 2011

Ph.D. in Computer Science (received Oct 2011)
Dissertation: *Describable Visual Attributes for Face Images*

Advisors: Peter N. Belhumeur and Shree K. Nayar

M.Phil. in Computer Science (received Oct 2009)

M.S. in Computer Science (received May 2007)

Georgia Institute of Technology

Aug 2000–May 2005

B.S. in Computer Science (with Highest Honors)

B.S. in Aeronautical Engineering (with Highest Honors)

Minor in Music (Clarinet Performance)

WORK EXPERIENCE

Dropbox

Sep 2014–present

Software Engineer

Photo Science Group, led by Ramesh Balakrishnan

University of Washington at Seattle

Sep 2011–Aug 2014

Software Engineer

Supervisor: Steve Seitz


I worked on projects that embed computer vision in the world today by taking advantage of non-vision knowledge to solve vision problems. This includes the use of GPS and timestamps to identify places, holidays, and events in photo collections, on-the-fly training of classifiers using fast vision techniques, and extracting detailed knowledge of relationships of people and other entities from knowledge bases like Freebase.

Automatic Face Systems

Nov 2008–Dec 2012

Co-Founder and Chief Technical Officer

with Peter N. Belhumeur and Shree K. Nayar

I was the technical lead on the commercialization of my PhD thesis work. We released, for research use, a webservice to run our face attribute classifiers, and in collaboration with Securics, Inc. , a prototype attribute-based face image search engine.

Kriegman-Belhumeur Vision Technologies

September 2009–December 2012

Consultant

with Peter N. Belhumeur and David J. Kriegman

I gathered a new labeled dataset for developing better fiducial localization for face images, and developed some related software tools.

Leafsnap 

May 2009–Aug 2011

Software Lead

with Peter N. Belhumeur and David W. Jacobs

I oversaw the entire software, data, and systems stacks for Leafsnap, the first electronic field guide for plants. In addition to writing much of the backend code and managing the operations and deployment on the server, I mentored over thirty volunteer students, contributed to the research on key algorithms, and collaborated on the interface and visual design of the apps and website.

Columbia University

Sep 2005–Aug 2011

Graduate Research Assistant

Advisors: Peter N. Belhumeur and Shree K. Nayar

I developed methods to automatically train classifiers that detect *describable visual attributes* (such as gender, age, and ethnicity for faces) for search and recognition using large collections of real-world images. I also explored automatic face replacement in images for privacy protection.

Microsoft Research

Summer 2005

Software Developer Intern

Microsoft Robotics Studio, led by Tandy Trower

I worked on developing the computer vision API for Microsoft Robotics Studio. This included detection and tracking of edges, circles, blobs, and faces.

Georgia Institute of Technology

Jan 2004–May 2005

Undergraduate Research Assistant

Advisor: James Rehg

I developed software to calibrate and synchronize a Vicon motion capture system with a number of video cameras placed at arbitrary locations in the capture environment.

NVIDIA Corporation

Summer 2004

Software Developer Intern

OpenGL Driver Group, led by Paul Keller

I worked on improving test coverage in the OpenGL driver (including fixing any associated bugs) for Vertex Buffer Objects (VBOs). I also created a new performance regression test suite.

Audiomatch.net

Mar 2004–Dec 2007

Co-Founder and Lead Programmer

with Roy Kim

audiomatch.net was one of the first sites to provide real-time tracking of a user's music listening history and recommend new music. I developed everything except the website.

University of North Carolina at Chapel Hill

Summer 2002, 2003

Research Assistant

Advisor: Lars Nyland

I developed a tool to visualize alignments of multiple 3d range scans and implemented various alignment algorithms to compare their accuracy and performance.

TEACHING EXPERIENCE

University of Washington, Seattle, WA

Co-instructor with Bryan C. Russell
CSE 490V: Computer vision seminar

Fall 2011

Columbia University, New York, NY

Teaching Assistant
COMS 4731: Computer vision

Fall 2006, Fall 2007

ADVISING

Undergraduate students co-advised with Steve Seitz

Aaron Nech
Laura Dong, Atanas Kirilov



Winter-Spring 2014
Spring 2013

MS students co-advised with Peter Belhumeur

Wei An, Chun-Kang Chen, Yu Huang, Peiti Li, Yin Liu, Oliver Sui,
Guangyu Sun, Yi Zhang, Wenxin Zhu
Aman Agarwal, Gaurav Agarwal, Kaushik Kaul, Nikhil Mhatre, Lin
Tsung-Kai, Weikang Wan
Vinay Sharma
Jian Ma
Wei Li, Qi Liang, Priyank Singh, Simon Yang, Vincent Zeng
Vinay Bettadapura
Ila Agarwal, Xin Wang
Jungseock Joo, Hui Qiao
Swati Kumar, Lin Yang
Samreen Dhillon, Tarandeep Singh

Spring 2011
Fall 2010–Spring 2011
Summer 2010
Spring 2010–Spring 2011
Spring 2010
Fall 2009–Spring 2010
Summer 2009–Fall 2009
Fall 2008–Spring 2009
2008
Fall 2007

INVITED TALKS

4. "Leafsnap - Automatic Plant Species Identification." 
Digital Media Analysis, Search and Management Workshop, San Diego, CA Feb 27, 2012
University of Washington Optimization Seminar Mar 12, 2013
3. "Describable Visual Attributes for Face Search and Recognition." 
New York University, New York, NY Apr 18, 2011
University of California, Berkeley, CA Apr 20, 2011
University of Washington, Seattle, WA Apr 22, 2011
University of Texas, Austin, TX Apr 25, 2011
Carnegie Mellon University, Pittsburgh, PA May 10, 2011
University of North Carolina, Chapel Hill, NC May 25, 2011
University of California, San Diego, CA Feb 29, 2012
Duke University, Durham, NC Apr 16, 2012
2. "Combining Attributes with Low-Level Features for Face Verification."
University of Maryland, College Park, MD Oct. 1, 2010
1. "Describable Visual Attributes for Face Search and Verification."
IEEE Conference on Biometrics, Identity and Security (BIdS), Tampa, FL Sep. 23, 2009

HONORS

Outstanding Reviewer

Conference on Computer Vision and Pattern Recognition (CVPR)

June 2012

Awarded to 40 of 935 total reviewers (4.3%)

National Defense Science and Engineering Graduate Fellowship

Aug 2005–Jul 2008

\$31,000/yr + tuition

Awarded to 15 computer science students across all of the United States

Georgia Institute of Technology Dean's List

Fall 2000–Spring 2005

All 10 semesters

PRESS COVERAGE

13. "How Facebook's Machines Got So Good At Recognizing Your Face," [↗](#)
Fast Company (Interview), March 29, 2014.
12. "A Look Into Facebook's Potential To Recognize Anybody's Face," [↗](#)
All Tech Considered (Radio Interview), National Public Radio, October 28, 2013.
11. "Gardening by the App," [↗](#)
The New York Times, April 4, 2012.
10. "What Is That? Let Your Smartphone Have a Look," [↗](#)
The New York Times, August 31, 2011.
9. "Leafsnap app," [↗](#)
The Washington Post, May 23, 2011.
8. "Leafsnap for iPhone and iPad," [↗](#)
Gizmodo, May 23, 2011.
7. "Free iPhone App Identifies Tree Leaves," [↗](#)
Wired, May 9, 2011.
6. "For The High-Tech Naturalist: LeafSnap Identifies Leaves Using Your iPhone's Camera," [↗](#)
TechCrunch, May 8, 2011.
5. "The mobile phone app that can identify a tree by its leaf," [↗](#)
The Guardian, May 6, 2011.
4. "A Tree Expert in Your Back Pocket," [↗](#)
Science, May 6, 2011.
3. "Digital field guides eliminate the guesswork," [↗](#)
The New York Times, May 9, 2009.
2. "Backyard scientists use Web to catalog species, aid research," [↗](#)
CNN.com, May 4, 2009.
1. "Software protects privacy by replacing faces in photographs,"
Future Tense (Radio Interview), American Public Media, July 31, 2008.

REFEREED PUBLICATIONS¹

14. **Neeraj Kumar** and Steven Seitz, “Photo Recall: Using the Internet to Label Your Photos,” *2nd Workshop on Web-scale Vision and Social Media (VSM) at CVPR*, June 2014.
13. **Neeraj Kumar** and Steven Seitz, “Photo Recall: Using the Internet to Label Your Photos,” *Proceedings of the 23rd International Conference on World Wide Web companion*, April 2014.
12. Peter N. Belhumeur, David W. Jacobs, David J. Kriegman, and **Neeraj Kumar**, “Localizing Parts of Faces Using a Consensus of Exemplars,” *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, vol. 35, no. 12, pp. 2930–2940, December 2013. [↗](#)
11. Walter Scheirer, **Neeraj Kumar**, Vijay N. Iyer, Peter N. Belhumeur, and Terrance E. Boult, “How Reliable are Your Visual Attributes?,” *Proceedings of SPIE Volume 8712: Defense, Security, and Sensing*, April 2013.
10. **Neeraj Kumar**, Peter N. Belhumeur, Arijit Biswas, David W. Jacobs, W. John Kress, Ida Lopez, and João V. B. Soares, “Leafsnap: A Computer Vision System for Automatic Plant Species Identification,” *Proceedings of the 12th European Conference on Computer Vision (ECCV)*, October 2012 (oral presentation). [↗](#)
9. Walter Scheirer, **Neeraj Kumar**, Peter N. Belhumeur, and Terrance E. Boult, “Multi-Attribute Spaces: Calibration for Attribute Fusion and Similarity Search,” *Proceedings of the 25th IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2012. [↗](#)
8. Walter Scheirer, **Neeraj Kumar**, Karl Ricanek, Terrance E. Boult, and Peter N. Belhumeur, “Fusing with Context: a Bayesian Approach to Combining Descriptive Attributes,” *Proceedings of the IEEE International Joint Conference on Biometrics (IJCB)*, October 2011 (oral presentation). [↗](#)
7. Ohil K. Manyam, **Neeraj Kumar**, Peter N. Belhumeur, and David J. Kriegman, “Two faces are better than one: Face recognition in group photographs,” *Proceedings of the IEEE International Joint Conference on Biometrics (IJCB)*, October 2011. [↗](#)
6. **Neeraj Kumar**, Alexander C. Berg, Peter N. Belhumeur, and Shree K. Nayar, “Describable Visual Attributes for Face Verification and Image Search,” *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, vol. 33, no. 10, pp. 1962–1977, October 2011. [↗](#)
5. Peter N. Belhumeur, David W. Jacobs, David J. Kriegman, and **Neeraj Kumar**, “Localizing Parts of Faces Using a Consensus of Exemplars,” *Proceedings of the 24th IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2011. [↗](#)
4. **Neeraj Kumar**, Alexander C. Berg, Peter N. Belhumeur, and Shree K. Nayar, “Attribute and Similarity Classifiers for Face Verification,” *Proceedings of the 12th IEEE International Conference on Computer Vision (ICCV)*, pp. 365–372, October 2009 (oral presentation). [↗](#)
3. **Neeraj Kumar**, Peter N. Belhumeur, and Shree K. Nayar, “FaceTracer: A Search Engine for Large Collections of Images with Faces,” *Proceedings of the 10th European Conference on Computer Vision (ECCV)*, pp. 340–353, October 2008. [↗](#)
2. **Neeraj Kumar**, Li Zhang, and Shree K. Nayar, “What is a Good Nearest Neighbors Algorithm for Finding Similar Patches in Images?,” *Proceedings of the 10th European Conference on Computer Vision (ECCV)*, pp. 364–378, October 2008. [↗](#)

¹In computer vision, the top conferences are ICCV, CVPR, and ECCV. These are all rigorously peer-reviewed, with acceptance rates around 20%, and under 5% for oral presentations. In computer graphics, the top conference is SIGGRAPH, with acceptance rates around 20%. SIGGRAPH papers are published in the *ACM Transactions on Graphics*.

1. Dmitri Bitouk, **Neeraj Kumar**, Samreen Dhillon, Peter N. Belhumeur, and Shree K. Nayar, "Face Swapping: Automatically Replacing Faces in Photographs," *ACM Transactions on Graphics (Proceedings of SIGGRAPH)*, vol. 27, no. 3, August 2008 (oral presentation). [↗](#)

OTHER PUBLICATIONS

1. **Neeraj Kumar**, "Describable Visual Attributes for Face Images," *PhD. Thesis*, Technical Report CUCS-035-11, Department of Computer Science, Columbia University, August 2011. [↗](#)

PROFESSIONAL ACTIVITIES

Co-Organizer: 2nd Workshop on Fine-Grained Visual Categorization (FGVC), in conjunction with CVPR 2013 (with Anelia Angelova, Steve Branson, Ryan Farrell, and Florent Perronnin)

Reviewer [2008-2014]: SIGGRAPH, SIGGRAPH Asia, CVPR, ECCV, ICCV, PAMI, IJCV, NIPS, ACM Multimedia

MISCELLANEOUS

Citizenship: United States

Languages: English & Hindi (native), Spanish (fluent)