

Santosh Kumar Divvala

Robotics Institute,
Carnegie Mellon University,
5000 Forbes Avenue,
Pittsburgh, PA 15213, USA.

Office: Smith Hall 212
Office Phone: +1 (412) 268-5808
Email: santosh@ri.cmu.edu
<http://www.cs.cmu.edu/~santosh>

Education

Ph.D. candidate in Robotics (Expected 2012)
Robotics Institute, Carnegie Mellon University (CMU), Pittsburgh, USA
Thesis Committee: Martial Hebert (Chair), Alexei (Alyosha) Efros (Co-Chair),
Takeo Kanade, Deva Ramanan

M.S. in Robotics May 2010
Robotics Institute, Carnegie Mellon University (CMU), Pittsburgh, USA

B.Tech (with Honors), and M.S. in Computer Science May 2006, 2007
International Institute of Information Technology, Hyderabad (IIITH), India
Research advisors: CV Jawahar, PJ Narayanan
Gold Medalist (for the highest GPA amongst the graduating class)

Research Interests

I am interested in Computer Vision, specifically the Scene/Image Understanding problem. My approach to this problem takes a Machine Learning perspective so as to leverage today's Internet-scale image and video databases. The results of my research apply to Robotics (helping robots better 'interpret' the world around them) and to Computational Photography (enhancing the way we humans relish our photo collections).

Research Experience

- Robotics Institute, CMU (2007 onwards): Single image scene understanding, and Context-driven image interpretation. Focus has been on reasoning about an image and the regions/objects within it using *context* derived from millions of web images
- Center for Visual Information Technology, IIITH (2004-2007): Vision-based robot exploration, Visual servoing. Principle contribution has been the design, implementation, and analysis of algorithms for autonomous robot navigation in unstructured environments

Professional/Academic Experience

- Reviewer: ICMLA'11, ICAR'11, CVPR'11, ICML'10, ICCV'09, IROS'09, EURASIP Image & Video Processing (IVP) 2008, WACV'07, ICCTA'07
- Intern, Computer Vision Research Group, Google. Business Recognition in Google Street-view with Mei Han and Sergey Ioffe (Summer'11)
- Intern, Interactive Visual Media Group, Microsoft Research. Parts-based Object detection with Larry Zitnick, Simon Baker and Ashish Kapoor (Summer'10)
- Research Qualifier Committee at CMU for Edward Hsiao (RI), Natasha Kholgade (RI), and Ekaterina Taralova (CSD)
- Visiting research student, Willow group, École Normale Supérieure, Paris. (Fall'09)
- Research Assistant, Vision and Mobile Robotics Lab, CMU. Implemented the KIST Object Recognition system in C++ and analyzed its performance (Fall'07, Summer'08)
- RoboBuddy (mentor) for incoming graduate students at RI, CMU (2009-11)
- Teaching (CMU): *Computational Photography* taught by Alexei Efros. Responsibilities included giving lectures/tutorials, grading exams, and holding office hours (Fall'08)
- Teaching (IIITH): *Pattern Recognition* (Spring'05), *Signal Processing* (Fall'04) & *Engineering Mathematics* (Spring'04). General responsibilities included conducting weekly recitations, grading homeworks & exams
- Intern, Imaging Technologies Lab, GE Global Research, India. Devised and implemented algorithms in C++ for tracking neuro-vascular arteries (Summer'05)
- Finance Secretary, IIIT Student Parliament. Managed student activity funds (2004-06)
- Cultural Secretary, Sacred Heart School. Helped organize cultural events (1999-00)

Selected Projects/Publications

- Santosh K. Divvala, Alexei A. Efros and Martial Hebert. "---", *In Review at CVPR'12*
- Santosh K. Divvala, Svetlana Lazebnik, Alexei A. Efros, and Martial Hebert. "Unsupervised Patch-based Context from Millions of Images", Tech Report, CMU 2011
- Tomasz Malisiewicz, and Santosh K. Divvala. "Learning Visual Subcategories for Basic-Level Categorization", *Fine Grained Visual Categorization Workshop, CVPR'11*
- Santosh K. Divvala, Larry Zitnick, Ashish Kapoor, and Simon Baker. "Object Detection using Unsupervised Parts-based Attributes", *PASCAL VOC'10 Challenge, ECCV'10*
- Santosh K. Divvala, Derek Hoiem, James H. Hays, Alexei A. Efros and Martial Hebert. "An Empirical Study of Context in Object Detection", *CVPR'09*
- Derek Hoiem, Santosh K. Divvala and James H. Hays. "A Unified Framework for Classification, Detection and Segmentation", *PASCAL VOC'08 Challenge, ECCV'08*
- Santosh K. Divvala, Alexei A. Efros and Martial Hebert. "Can Similar Scenes help Surface Layout Estimation?", *Internet Vision Workshop, CVPR'08*
- Santosh K. Divvala, J. Andrew Bagnell and Martial Hebert. "A Space-Carving Approach to Surface Estimation", Tech Report, CMU 2008
- Santosh K. Divvala, A. Supreeth and CV Jawahar. "Autonomous Image-based Exploration for Mobile Robot Navigation", *ICRA'08*
- Santosh K. Divvala. "Vision-based Robot Navigation using an Online Visual Experience", *Master's Thesis, IIIT Hyderabad 2007*
- Santosh K. Divvala and CV Jawahar. "Visual Servoing in Non-Rigid Environments: A Space-Time Approach", *ICRA'07*
- Santosh K. Divvala and CV Jawahar. "Robust Homography-based Control for Camera Positioning in Piecewise Planar Environments", *5th Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP) 2006*
- Santosh K. Divvala and CV Jawahar. "Visual Servoing in presence of Non-Rigid Motion", *ICPR'06*

Advanced Courses

- Optimization
- Graphical Models
- Machine Learning
- Statistical Machine Learning
- Pattern Recognition
- Linear Algebra
- Geometry-based Vision
- Physics-based Vision
- Learning-based Vision
- Computer Vision
- Computer Graphics
- Computational Photography
- Mechanics of Manipulation
- Mobile Robotics
- Multi Robotic Systems
- Artificial Intelligence
- Control Systems
- Image & Signal Processing

Computing Skills

- Languages/Tools: Matlab, C/C++, OpenCV
- Systems: Strong Linux and Windows Skills, Cluster Computing (MapReduce @ Google, HPC @ Microsoft, PBS @ CMU)

Talks

- "Learning Visual Subcategories for Basic-level Categorization", Google PhD Lightning Tech Talk (07/2011).
- "Appearance-based Mixture Models for Object Detection", CMU Graphics Lab (11/2010)
- "Scene Understanding from a Large Collection of Images", Stanford DAG lab (11/2010), Google Research - Mountain View (11/2010).
- "Contextual Scene Understanding", Google Research - Seattle (08/2010).
- "Scene Understanding from a Single Image", VisTech Seminar, MSR Redmond (05/2010).
- "To Segment or Not To Segment", ViSU Workshop, CVPR 2009, Miami, USA.
- "A Unified Approach for Detection, Classification, and Segmentation", PASCAL Visual Object Classes Challenge, ECCV 2008, Marseille, France.
- "Can Similar Scenes help Surface Layout Estimation?", Internet Vision Workshop, CVPR 2008, Anchorage, USA.
- "Visual Servoing in Non-Rigid Environments: A Space-Time Approach", ICRA 2007, Rome, Italy.

Honors and Achievements

- PASCAL Visual Object Class Challenge at ECCV'08, Honorable Mention, Fall 2008
- Research Assistantship for Ph.D. studies, Robotics Institute, CMU, USA (2007-present)
- Research Assistantship for Master's studies, IIIT Hyderabad, India (2006-2007)
- IIIT Gold Medal for obtaining the highest GPA in the Graduating Class of B.Tech 2006
- IIIT Dean's award for academic excellence in all undergrad semesters (2002-2006)
- Pratibha Scholarship (from Govt of India) for pursuing undergrad studies (2002-2006)
- High School Merit Scholarship (2000-2002)

Misc.

Languages: Fluent in English; Native in Telugu and Hindi; Basic French and Tamil

Interests: Racquet sports, Traveling, Cooking (Vegetarian)