

NAVNEET DALAL

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Objective

A full-time research scientist position utilizing my experience in computer vision and statistical learning for developing products with lasting impact.

Education

INRIA Rhône-Alpes, France

June 2006

Ph.D. in Computer Vision, School of Computer Science and Applied Mathematics

Advisers: Dr. Bill Triggs and Dr. Cordelia Schmid

- Proposed a new algorithm for person detection in images improving performance by 30 fold over the state-of-the-art; algorithm won 6 out of 10 competitions in international visual-object localization challenge organized by European Network of Excellence programme PASCAL.

Institut National Polytechnique de Grenoble, France

June 2003

M.S. in Computer Science and Applied Mathematics

14.3/20 (3.9 equivalent)

Major: Imaging, Vision, and Robotics

- Awarded EGIDE (French agency for international scholars) scholarship for graduate and doctoral research.
- Ranked year's best master thesis project among 35 submitted to college of Vision and Robotics.

University of Delhi, India

May 1999

Netaji Subhas Institute of Technology

80.1% (4.0 equivalent)

B.E. in Computer Engineering

- Awarded Distinction; awarded merit-based scholarship during undergraduate years.
- Ranked 27th among 20,000 applicants in All-India examination for entrance in undergraduate school.

Book

Coauthoring a book "*Nonparametric Analysis of Visual Data: the Mean Shift Paradigm*" with Dorin Comaniciu, Siemens Corporate Research, and Peter Meer, Rutgers University, NJ. Publisher: Springer. Tentative publishing date: late 2006.

- Pioneer book in the subarea connects the mean shift statistical theory to current applications in computer vision and pattern analysis.

Experience

Graduate Researcher, INRIA Rhône-Alpes, France

10/2001 – Present

- Researched on robust feature spaces for reliable detection and localization of objects in images and videos.

Advisers: Dr. Bill Triggs and Dr. Cordelia Schmid

09/2003 – Present

- Developed feature spaces based on oriented histograms of image gradients for object detection in images. The feature spaces represent dense map of substantially overlapped, locally normalized image blocks. They are very fast to compute and the overall detection framework runs close to real time.
- Introduced new motion based feature spaces for person detection in videos. Local differential motion vectors (from two consecutive images) are mapped to oriented histogram space and fused with static appearance based features. New features capture characteristic motion of a person which can be further exploited for activity recognition. The overall performance gain is an order of magnitude better over static image descriptors.
- Investigated on parts based person detection which allows robust detection of partly occluded persons. Different specific body part detectors are fused with corresponding automatically determined pose information to create a reliable person detector.
- Proposed algorithms for automatic visualization and analysis of athletic video sequences.
Adviser: Dr. Radu Horaud
- Developed algorithms for creating "motion panoramas" from challenging athletic video sequences containing significant camera motion and unconstrained athlete's movements. Motion panoramas creates a static background panorama where pixel-level video statistics are used to automatically remove the foreground athlete motion and a second panorama with athlete motion overlaid on the static panorama.
- Formulated constraints and derived equations for 3-D reconstruction of athlete's trajectories from a single camera; shows feasibility with excellent results on high jump and pole vault videos.
- Proposed time warping algorithm for automatic indexing and synchronization of two or more video sequences containing similar athletic events.

Team Lead, European Union (EU) project ACEMEDIA 01/2004 – Present

- Led cross-functional team of 5 non-direct reports (distributed across INRIA, France Télécom R&D and Philips Research) delivering a critical “Person Detection and Identification” module worth €200K; the deliverable received special mention for quality of innovation at EU review of €9.9M parent project.
- Represent INRIA at project meetings proposing design and implementation strategies, and exploring futuristic scenarios in digital media content analysis of EU technology commercialization project involving 15 industrial/academic partners and 60 researchers.

Intern, Siemens Corporate Research (SCR), Princeton, NJ 04/2003 – 08/2003

- Proposed a statistical solution for multi-scale detection of local anisotropic image structures. The algorithm estimates the optimal anisotropic fit over scale-space for points in n -d space.
- Principle inventor of US patent No. 2003P15288US01; status filed.

Developer, EU project EVENTS, France 10/2001 – 03/2003

- Developed image interpolation algorithms in collaboration with Robotics Research Group, Oxford University, for realistic rendering of novel views from two or more images.
- Represented INRIA at EU project review and convinced reviewers of market potential and superiority (compared to competitors) of the technology developed during the project – resulting continuity of €330,000 project.

Research Engineer, Eyesmax Software, India – Infinitface Inc., Japan 05/2000 – 09/2001

- Spearheaded development of the core module of image rendering product and helped gain investors’ confidence in the startup; delivered the module within 25% of estimated schedule, achieving six months lead in time-to-market.
- Developed automatic image annotation algorithm reducing graphic designers effort by 35%.
- Developed real-time novel image rendering algorithm essential for making product marketing feasible.

Software Engineer, River Run Software Group, Noida, India 06/1999 – 05/2000

- Performed major architectural and development enhancements for compatibility of Windows CE office product, reducing support effort by 80% – saving \$48,000 per annum.

Publications and Patents

Patents

- N. Dalal and D. Comaniciu. *Multi-scale Detection of Local Image Structures*. US Serial No. 2003P15288US01, filed September 2004.

Refereed Journals

- N. Dalal, B. Triggs and C. Schmid. Object Detection Using Histograms of Oriented Gradients. In preparation for submission to *Pattern Analysis and Machine Learning*.
- T. Rodríguez, I. Reid, R. Horaud, N. Dalal and M. Goetz. Image interpolation for virtual sports scenarios. In *Journal of Machine Vision and Applications*, June 2005.
- A. Bartoli, N. Dalal and R. Horaud. Motion Panoramas. In *Journal of Computer Animation and Virtual Worlds*, December 2004. 15(5): 501-517. (Also INRIA Research Report – 4771, 2003).

Refereed Conferences and Workshops

- N. Dalal, B. Triggs and C. Schmid. Human Detection Using Oriented Histograms of Flow and Appearance. In *Proceedings of the European Conference on Computer Vision*, Graz, Austria, May 2006.
- N. Dalal and B. Triggs. Histograms of Oriented Gradients for Human Detection. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, San Diego, USA, June 2005. Vol. II, pp. 886-893.
- K. Okada, D. Comaniciu, N. Dalal and A. Krishnan. A Robust Algorithm for Characterizing Anisotropic Local Structures. In *Proceedings of the Eighth European Conference on Computer Vision*, Prague, Czech Republic, May 2004. Vol. I, pp. 549-561.
- N. Dalal and R. Horaud. Indexing Key Positions between Multiple Videos. In *Proceedings of the IEEE Workshop on Motion and Video Computing*, Orlando, Florida, USA, December 2002, pp. 65-71.
- A. Bartoli, N. Dalal, B. Bose and R. Horaud. From Video Sequences to Motion Panoramas. In *Proceedings of the IEEE Workshop on Motion and Video Computing*, Orlando, Florida, USA, December 2002, pp. 201-207.

Book Chapter

- M. Everingham et al. The 2005 PASCAL Visual Object Classes Challenge. In F. d’Alche-Buc, I. Dagan, J. Quinero (eds), *Selected Proceedings of the first PASCAL Challenges Workshop*, LNAI, Springer, (in press) 2006.

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Others

- N. Dalal, B. Triggs and C. Schmid. Parts Based Histogram Voting for Semi-occluded Human Detection. INRIA Research Report. In preparation.
- N. Dalal. Using Dynamics Contained in Athletic Video Sequences. MS thesis: Institut National Polytechnique de Grenoble, France, June 2002.

Professional Activities

- Peer reviewer for IEEE Transactions on Pattern Analysis and Machine Intelligence (ad-hoc basis), International Conference on Computer Vision (2005), IEEE Conference on Computer Vision and Pattern Recognition (2005, 2004), European Conference on Computer Vision (2004).

Additional

- **Visiting Scholar** : Robotics Research Group, Oxford University, UK, July 2002.
- **Software Skills** : Excellent C/C++, Matlab, Linux/Unix, Windows.
- **Multilingual** : Fluent in English, Hindi; competent in French.
- **Citizenship** : Indian.
- **References** : Upon request
- **Interests** : Enjoy skiing, hiking, and long bike rides; won city level drawing competitions.

January 31, 2006