Leonid Sigal

CONTACT INFORMATION

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RESEARCH INTERESTS

Computer Vision: visual tracking and learning of human motion, motion analysis, object detection and recognition.
Machine Learning: graphical models, hierarchical models, non-parametric models and inference methods.

EDUCATION

Brown University, Providence, RI USA

Ph.D., Computer Science, May 2007 (*expected*)
Sc.M., Computer Science, May 2003

- Dissertation Topic: "Continuous-state Graphical Models for Object Localization, Pose Estimation and Tracking"
- Advisor: Michael J. Black
- Committee: Michael J. Black, William Freeman, John F. Hughes, David Mumford

Boston University, Boston, MA USA

M.A., Computer Science, September 1999

- Dissertation Topic: "Skin Color Tracking Under Time-Varying Illumination"
- Advisor: Stan Sclaroff

B.A., Computer Science, May 1999
B.A., Mathematics, May 1999

HONORS AND AWARDS

Best Paper Award 2006

IV Conference on Articulated Motion and Deformable Objects
for "Predicting 3D People from 2D Pictures" (jointly with Michael J. Black)

Dissertation Fellowship, Brown University 2006
Deans Fellowship, Brown University 2001/2002
United States Achievement Award 1996

ACADEMIC EXPERIENCE

Brown University, Brown, RI USA

Research Assistant **September, 2001 - present**
Working on high-dimensional contineous-state models for computer vision applications, such as autonomous object motion and pose estimation from images and video. Developed a number of techniques for 3-D articulated human pose estimation and tracking using graphical models and non-parametric inference methods.

Teaching Assistant **Fall, 2005**
Computer Science, CS143 - Introduction to Computer Vision
Assisted in developing the curriculum and homework assignments. Duties included office hours, teaching, and grading of homeworks. Gave several in-class tutorials and lectures.

Boston University, Boston, MA USA

Research Assistant **December, 1998 - September, 1999**
Conducted research on the rigid object tracking in the real-time video sequences using statistical models and color-based segmentation.

Teaching Assistant **1997 - 1999**
Mathematics and Statistics, MA113 - Elementary Statistics I
Mathematics and Statistics, MA123 - Calculus I
Mathematics and Statistics, MA124 - Calculus II
Duties at various times have included office hours, teaching of discussion sections, and grading of homeworks.

Professional Service

Program Chair or Organizer

Co-Organizer, EHuM: Evaluation of Articulated Human Motion and Pose Estimation Workshop, in conjunction with Neural Information and Processing Systems (NIPS), December 2006.
Co-Organizer, EHuM$_2$: 2nd Workshop on Evaluation of Articulated Human Motion and Pose Estimation, in conjunction with IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), June 2007.

Professional Societies

Member of the ACM, the IEEE, the IEEE Computer Society.

Department Service

Organized bi-weekly series of faculty/graduate student discussion lunches in 2006.
Helped to organize graduate student interviews during Brown CS faculty search in 2004.

Reviewing

Reviewed journal papers for:
Computer Vision and Image Understanding
IEEE Transactions on Pattern Analysis and Machine Intelligence
IEEE Transactions on Image Processing
IEEE Transactions on Systems, Man, and Cybernetics
IEEE Transactions on Circuits and Systems for Video Technology
IEEE Transactions on Multimedia
Pattern Recognition

Reviewed conference and workshop papers for:
Computer Vision and Pattern Recognition (2004-2007)
European Conference on Computer Vision (2004)
IEEE International Conference on Computer Vision (2005)
IEEE International Workshop on Analysis and Modeling of Faces and Gestures (2003)

Journal Publications

L. Sigal, S. Sclaroff and V. Athitsos. Skin Segmentation under Time-Varying Illumination. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 26(7), pp. 862-877, July 2004.

Refereed Conference Publications

L. Sigal and M. J. Black. Predicting 3D People from 2D Pictures. *In Proc. of IV Conf. on Articulated Motion and Deformable Objects (AMDO)*, Springer-Verlag LNCS 4069, pp. 185-195, July 2006. (**Best Paper Award**)

L. Sigal and M. J. Black. Measure Locally, Reason Globally: Occlusion-sensitive Articulated Pose Estimation. *In Proc. of IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, vol. 2, pp. 2041-2048, New York, NY, June 2006.

L. Sigal, S. Bhatia, S. Roth, M. J. Black and M. Isard. Tracking Loose-limbed People. *In Proc. of IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, vol. 1, pp. 421-428, Washington, DC, June 2004.

S. Roth, L. Sigal and M. J. Black. Gibbs Likelihoods for Bayesian Tracking, *In Proc. of IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, vol. 1, pp. 886-893, Washington, DC, June 2004.

L. Sigal, M. Isard, B. Sigelman and M. J. Black. Attractive people: Assembling loose-limbed models using non-parametric belief propagation. *In Proc. of Neural Information Processing Systems (NIPS)*, 2003.

H. Sidenbladh, M. J. Black and L. Sigal. Implicit probabilistic models of human motion for synthesis and tracking. *In Proc. of European Conference on Computer Vision (ECCV)*, Springer-Verlag LNCS 2353, Vol. 1, pp. 784-800, 2002.

R. Rosales, V. Athitsos, L. Sigal and S. Sclaroff. 3D Hand Pose Reconstruction Using Specialized Mappings. *In Proc. of International Conference on Computer Vision (ICCV)*, 2001.

L. Sigal, S. Sclaroff and V. Athitsos. Estimation and Prediction of Evolving Color Distributions for Skin Segmentation Under Varying Illumination. *In Proc. of IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, vol. 2, pp. 152-159, Hilton Head Island, SC, June 2000.

CONFERENCE PAPERS UNDER REVIEW

A. Balan, L. Sigal, M. J. Black, J. Davis and H. Haussecker. Detailed Human Shape and Pose from Images. *Submitted to IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, Minneapolis, MN, June 2007.

REFEREED WORKSHOP PUBLICATIONS

A. Balan, L. Sigal and M. J. Black. A Quantitative Evaluation of Video-based 3D Person Tracking. *In Proc. of IEEE International Workshop on Visual Surveillance and Performance Evaluation of Tracking and Surveillance (VS-PETS)*, pp. 349-356, October 2005.

L. Sigal, Y. Zhu, D. Comaniciu and M. J. Black. Tracking Complex Objects using Graphical Object Models. *In Proc. of 1st International Workshop on Complex Motion*, 2004.

S. Bhatia, L. Sigal, M. Isard and M. J. Black. 3D Human Limb Detection using Space Carving and Multi-view Eigen Models. *In Proc. of IEEE Workshop on Articulated and Nonrigid Motion*, 2004.

REFEREED ABSTRACTS

L. Sigal and M. J. Black. Hierarchical Approach for Articulated 3D Pose-Estimation and Tracking. *Learning, Representation and Context for Human Sensing in Video Workshop* (in conjunction with CVPR), 2006.

TECHNICAL REPORTS

L. Sigal and M. J. Black. HumanEva: Synchronized Video and Motion Capture Dataset for Evaluation of Articulated Human Motion. *Technical Report* CS-06-08, Brown University, Providence, RI, September 2006.

CONFERENCE AND WORKSHOP PRESENTATIONS

"HumanEva-I dataset and evaluation metrics",
EHuM: Evaluation of Articulated Human Motion and Pose Estimation Workshop, Whistler, BC, December 2006.

"Hierarchical Inference Framework for Articulated Pose Estimation and Tracking",
Canadian Institute for Advanced Research (CIAR), 2nd Neural Computation and Adaptive Perception Summer School, Toronto, Canada, August 2006.

"Predicting 3D People from 2D Pictures",
IV Conference on Articulated Motion and Deformable Objects, Mallorca, Spain, July 2006.

"Graphical Object Models for Detection and Tracking",
NIPS Workshop on Graphical Models and Kernels, Vancouver, BC, 2004.

INVITED TALKS

"Continuous-state Graphical Models for Object Localization, Pose Estimation and Tracking",

- Smith-Kettlewell Eye Research Institute, San Francisco, CA, January 2007.
- Stanford University, BioMotion Research Group Meeting, Stanford, CA, January 2007.
- University of Toronto, Toronto, Canada, January 2007.

"Hierarchical Inference Framework for Articulated Pose Estimation and Tracking",
Honda Research Institute, Mountain View, CA, August 2006.

"Loose-Limbed People Paradigm: Distributed Approach for Articulated Pose Estimation and Tracking",
MIT CSAIL Machine Vision Colloquium, Cambridge, MA, May 2006.

"Loosely Connected Body Model for Pose Estimation and Tracking",
10-th Anniversary of Image and Video Computing at Boston University, Boston, MA, May 2005.

OTHER TALKS

"Combining Tracking and Physics-based Simulation",
Intel Applications Research Lab (ARL), Santa Clara, CA, September 2006.

Guest lectures in Computer Science 143 at Brown University (*Introduction to Computer Vision*), fall term 2006.

"Finding and Tracking Loose-Limbed People: Distributed Approach",
Intel Applications Research Lab (ARL), Santa Clara, CA, August 2005.

"Attractive People: Assembling and Tracking Loose-Limbed Models using Non-Parametric BP",
Siemens Corporate Research, Princeton, NJ, December 2004.

PATENTS

Graphical Object Models for Detection and Tracking. US Patent Application, 11/135,210, *filed May 2004*.

Method and System for Aligning Geometric Object Models with Images. US Pat. 6,804,416. *October 2004*.

PROFESSIONAL EXPERIENCE

Intel Applications Research Lab, Santa Clara, CA USA

Research Intern **June, 2006 - Sep, 2006**

Designed and implemented new models and algorithms for tracking high speed athletic motions. Explored and developed algorithms for handling of motion blur and complex kinematics. Developed new class of physics-based priors for human motion.

Intel Applications Research Lab, Santa Clara, CA USA

Research Intern **June, 2005 - Sep, 2005**

Developed probabilistic computer vision algorithms for tracking of 3D human bodies in video sequences. Advanced the state of the art techniques by developing algorithms for efficient inference in graphical models. Incorporated developed algorithms into existing probabilistic human tracking system.

Siemens Corporate Research, Princeton, NJ USA

Research Intern **December, 2004 - May, 2004**

Developed novel statistical approaches to object detection and recognition for automated vehicle driver assistance. Formulated and developed a graphical model based approach for part-based object detection and tracking using AdaBoost likelihoods.

Cognex Corporation, Natick, MA USA

Senior Software Engineer **1999 - 2001**

Developed recognition software for industrial vision applications. Headed an effort in developing a new tool for pattern matching and alignment, capable of identification and verification of highly non-linearly distorted patterns. Worked on development of Optical Character Verification (OCV) and Optical Character Recognition (OCR) software.

P & E Microcomputer Systems Inc., Boston, MA USA

Sophomore Software Engineer **1995 - 1998**

Worked in a team of three on the development of an Integrated Assembler/Debugger Windows Package for the Motorola 68HC05, 68HC08, and 68HC3xx families of microcontrollers for professional commercial use.

BIOGRAPHIC

Citizenship: USA

REFERENCES

References are available upon request.