

Dr. Maheshkumar H. Kolekar

(Ph. D. IIT Kharagpur)

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Research Expertise and Interest

My research interests are in the fields of video summarization, content-based image/video indexing and retrieval, and multimedia communication. During Ph D, I worked on semantic concept mining in sports videos for automated highlight generation. Presently, I am working on the project titled, "*Tracking Vehicles Using GoogleEarth Road Networks in Persistence Surveillance Imagery*" sponsored by Persistence Surveillance System.

Highlights of Positive Trends

- **Post-doctoral fellow** in the Department of Computer Science and Forestry, University of Missouri, Columbia, USA during Feb 2008 to Nov 2009 and rejoined in April 2009.
- Contributed as member of **Technical Programme Committee** of IEEE Int Conf. on Ultra Modern Telecommunications (ICMUT) workshop on Unified Communication Networks and services for Nomads, St.-Petersburg, Russia, Oct 2009.
- **Ph. D.** from **Indian Institute of Technology** Kharagpur in Sept 2007.
- Recipient of Bharatiya Samaj Vikas Academy's national-level **Jewel of India Social Award**, 2008.
- Received **Ph D guide recognition** of Dr. B. A. Tech. University, Lonere since Jan 2008.
- Listed my name in Marquis **Who's Who in the World**, 2006.
- Writing the book titled, "Image and Video Processing" under ISTE Learning Material Programme for B. Tech level students.
- Organized two AICTE-ISTE sponsored national level **Short Term Training Programmes** on "Digital Image Processing and Pattern Recognition" and "Biomedical Signal and Image Processing" during July 31-Aug 11, 2001 and March 10-21, 2003 respectively.
- Contributed as a **reviewer** of International Journals and conferences.
- Contributed as **invited speaker** for delivering keynote address in national level conferences.
- Contributed as **resource person** for several AICTE, ISTE, and QIP sponsored Short Term Training Programmes.
- Published research papers at Int. level journals/ conferences viz. IEEE, SPIE, ACM, Springer.

Education

Degree: **Post-doctoral Fellow** (Since April 2009)

Department of Computer Science, University of Missouri, Columbia, USA.

Project: Video Event Analysis

Primary Activities: Video Event Analysis, Parallax Stabilized Image Mosaics, Biomedical Video Microscopy

Specific research Topics: Bayesian Networks, Graphical Models, Hidden Markov Models, SVM and Kernel Methods for the analysis of video datasets from different application domains,

multiview 3D structure estimation, parallel video and image processing algorithms, and fusion of multiple features and cues.

Grants: Project is supported by Leonard Wood Institute, Army Research Lab, National Institute of Health, NASA.

Degree: **Post-doctoral Fellow** (Feb 2008 to Nov 2009)

Department of Computer Science and Forestry, University of Missouri, Columbia, USA.

Project: Restructure of Sylvan programs (sponsored by NASA, NIH, US Forest Service)

Primary Activities: research, algorithm development and software engineering in visualization, remote sensing, computer vision and video processing, Journal and conference paper publications, and presentations in the fields of geospatial remote sensing, data fusion and computer graphics.

Specific research Topics: Sylvan dynamic simulation system, panchromatic and lidar information fusion for 3D structures, object segmentation, tracking, realtime implementations, 2D and 3D level set-based segmentation, and multi-camera oblique-view image co-registration

Grants: Project is supported by US Forest Service for Stabilizing and Releasing the Sylvan Structure Model, US National Institute of Health, NASA.

Degree: Doctor of Philosophy (**PhD**) (Sept 2007)

Indian Institute of Technology, Kharagpur (WB) India

Major: Content based Video Indexing and Retrieval

Thesis: Automated Semantic Concept Extraction, and Highlight Generation of Sports Video Sequences

Advisor: Prof. (Dr.) Somnath Sengupta

Subjects studied: Computer Vision, Multimedia Computing

Degree: Master of Engineering (**M.E.**) (Dec 1998 with First class)

SGGS College of Engineering and Technology, Nanded, M.S.

Major: Electronics Engg with Specialization in Computer Technology

Dissertation: Texture Segmentation using Fractal Dimension (Image processing and computer graphics based, implemented in C programming)

Advisor: Prof. (Dr.) S. N. Talbar

Subject Studied: Digital Image Processing, Pattern Recognition, Fuzzy Logic and Neural Network Applications, Advanced Digital Signal Processing, Modern Computer Network, Computer Graphics, Operating System Design, etc.

Degree: Bachelor of Engineering (**B.E.**) (in July 1993 with Distinction)

Shivaji University, Kolhapur, M.S.

Major: Electronics Engineering

Dissertation: Vibration Analyzer (DSP based, implemented in c programming)

Advisor: Prof. (Dr.) B. V. Barbadekar

Subject Studied: Digital Signal Processing, Digital Electronics, Signal and System, Digital Communication, Computer Graphics, etc

Awards and achievements

- Recipient of **High School Scholarship**, State Govt. of Maharashtra
- Recipient of the **Best Student Paper award** of Computer Society of India for the year 2004
- Recipient of the **Second Prize** for the research paper competition of Institution of Engineers (Orissa State), 2006

- Recipient of Bharatiya Samaj Vikas Academy's National Level **Jewel of India Social Award**, 2008
- Member of **Technical Programme Committee** of IEEE Int Conf. on Ultra Modern Telecommunications (ICMUT) workshop on Unified Communication Networks and services for Nomads, St.-Petersburg, Russia, Oct 2009.
- Member of the **International Committee** on AICIT's International Conference Series
- Member of IASTED's International Technical Committee on Modeling and Simulation
- Member of the **Board of Studies (BOS)**, Dr B. A. Technological University, Lonere, (MS)
- Contributed as **Reviewer** for International Conferences.
- Elected as a **Hall President**, Zakir Hussain Hall of Residence, IIT Kharagpur for academic year 2004-2005
- Listed my name in Marquis **Who's Who in the World**, 2006
- Contributed as **Chief Guest** for national-level conferences
- Delivered **keynote addresses** in national-level conferences

Visits abroad

I have visited Arizona (USA), Beijing (China), Melbourne (Australia) for presenting papers in the reputed International conferences. I have been awarded the fellowships for foreign travel grant by the following Indian Government Agencies: Indian National Science Academy, Department of Science and Technology, and Council of Scientific and Industrial Research, All India Council of Technical Education. From February 2008, I have joined as post doctoral fellow at University of Missouri, Columbia, USA.

Experience

- Thirteen years Research/Academic Experience:
 - From Nov 1997 to Nov 2007 as a Lecturer and Nov 2007 to till date as Assistant Professor in the Department of Electronics and Telecommunication Engineering, Dr. Babasaheb Ambedkar Technological University, Lonere-402103, India.
 - From July 1993 to Nov 1997 in few Engineering colleges in Maharashtra as a lecturer in Electronics and Telecommunication Engineering.
 - Subjects Taught at M. Tech Level: Digital Image Processing, Multimedia Computing, Computer Vision.
 - Subjects Taught at B. Tech Level: Digital Image Processing, C/C++ Programming, Artificial Intelligence, and Information Technology, Signals and Systems.
 - Recognized Ph D guide since Jan 2008.
- Three and half years Research Experience in the Department of E and ECE, **I.I.T, Kharagpur**, India as a Research Scholar for a research work that leads to degree of Ph.D.
- Post-doctoral fellowship experience at Department of Computer Science and Forestry, University of Missouri, Columbia, USA during Feb 2008 to Nov 2008
- Working as post-doctoral fellow at Department of Computer Science and Forestry, University of Missouri, Columbia, USA from April 2009 to till date
- Professional Training received:
 - Short Term Course on "VLSI Signal Processing", at Indian Institute of Technology, Kharagpur, during Nov 29 to Dec 4, 2007
 - Short Term Course on "DSP Tools and Practice", at Indian Institute of Technology, Kharagpur, during June 4 to June 8, 2007

- QIP Short Term Course on “Image and Video Processing”, at Indian Institute of Technology, Kharagpur, during Feb 19 to March 2, 2007
- Short term course on “Effective Teaching Skills” at IIT Kharagpur during Jan 31-Feb 5, 2005
- AICTE-ISTE sponsored Short Term Training Programme (STTP) on “VLSI: Technology of the future”, at Dr B.A. Tech. University, Lonere, during Feb 12-25, 2003
- AICTE-ISTE sponsored STTP on “Campus wide network administration”, at Dr B.A. Tech. University, Lonere, during Jan 13-25, 2003
- AICTE-ISTE sponsored STTP on “Distributed Object Computing using JAVA/CORBA”, at Dr B.A. Tech. University, Lonere, during Nov 26-Dec 8, 2001
- AICTE-ISTE sponsored STTP on “DSP - Design and Development Tool: MATLAB”, at Pune Institute of Computer Technology, Pune, during June 11-23, 2001
- AICTE-ISTE sponsored STTP on “Information Technology and its application”, at KBP College of Engineering, Satara, during Nov 27-Dec 23, 2000
- AICTE-ISTE sponsored STTP on “Design Automation using Computer”, at PVP Institute of Technology, Budhagaon, Sangli, MS, during May 29-June 9, 2000

Honors and Recognitions

- Contributed as invited speaker for delivering **keynote address** in following conferences
 - Contributed as **Chief Guest** and presented keynote address in National Conference at Udgir, Dist Latur, MS, Feb 27, 2009.
 - Contributed as a Chief Guest and presented keynote address in National Conference on Distributed Computing at College of Engineering, Osmanabad, March 20, 2009.
 - Contributed as a Chief Guest and presented keynote address in State-level Symposium REBEL 2009 at College of Engineering, Malegaon, Baramati, MS, March 19, 2009.
 - Presented keynote address on “*Role of Video Processing for Rural Development*” in National Conference on “Recent Trends in Information Technology for the Rural Development” sponsored by the Ministry of Information Technology, Govt. of India, at SSGM College of Engineering, Shegaon, Dec 9 and 10, 2007.
 - Presented keynote address “*Sports and News Video Indexing*” at National Conference at College of Engineering, Osmanabad, MS, February, 2008.
- Contributed as a **resource person** in the following short term training programmes /workshops
 - Presented talk on “*Texture Image Segmentation*” at Somaya College of Engineering, Mumbai, on 14th and 15th January, 2008.
 - Presented talk on “*Caption Content Analysis for Automated Sports Highlight Generation*” in QIP Short Term Course on “*Image and Video Processing*”, at Indian Institute of Technology, Kharagpur, on March 2, 2007
 - Presented talk on “*Trends in Sports Video Summarization*” at SGM College of Engineering, Shegaon on August 11, 2007.
 - Presented talk on “*Telemedicine*” in AICTE-ISTE Short Term Training Programmes on “Biomedical Signal and Image Processing”, at Dr. B. Ambedkar Technological University Lonere on March 18, 2003
 - Presented talk on “*Content Based Image Indexing*” in AICTE-ISTE Short Term Training Programmes on “Digital Image Processing and Pattern Recognition”, at Dr. B. Ambedkar Technological University Lonere on July 28, 2001
 - Presented talk on “*Image Enhancement Techniques*” in AICTE-ISTE Short Term Training Programmes on “Advanced Techniques of Image Processing”, at Rajarambapu Institute of Technology, Sakharale, Sangli, MS on June 5, 2001

List of Publications

Papers in Refereed Journals

1. M. H. Kolekar, K. Palaniappan, S. Sengupta and G. Seetharaman “*Semantic Concept Mining based on Hierarchical Event Detection for Soccer Video Indexing*”, Int. Journal on Multimedia, vol-4 (5), pp. 298-312, October 2009
2. M. H. Kolekar, S. Sengupta, “*Semantic Concept Mining in Cricket Videos for Automated Highlight Generation*”, in Springer Int. Journal on Multimedia Tools and Applications, 2009
3. M. H. Kolekar, K. Palaniappan, S. Sengupta, and R. F. Tuttle, “*Semantic Annotation Scheme for Broadcast Soccer Highlight Generation*”, Journal of Virtual Reality and Broadcasting, 2009
4. M.H. Kolekar, S. Sengupta, “*A Hierarchical Framework For Generic Sports Video Classification*”, in Springer Verlag Lecture Notes in Computer Science, vol. 3852, pp. 633-642, Jan 2006.
5. M. H. Kolekar, “*An Algorithm for Designing Optimal Gabor Filter for Segmenting Multi-textured Images*”, in IETE Journal of Research, India, vol. 48 (3-4), pp. 181-187, Jan 2002.
6. M. H. Kolekar, S. N. Talbar and T. R. Sontakke, “*Texture Segmentation using Fractal Signature*”, in IETE Journal of Research, India, vol. 46 (5), pp. 319-323, Jan 2000.
7. M. H. Kolekar, “*Hidden Markov Model based Highlight Generation of Cricket Video Sequence using Video and Audio Cues*”, in CSI Communications, vol. 28 (7), pp. 25-26, Jan 2005 [Received best student paper award].
8. M. H. Kolekar, S. Sengupta, “*A Probabilistic Framework For News Story Segmentation*”, in Institution of Engineer’s Journal of Annual Convention, Jan 2006. [Received Second Prize]

Papers in Conferences

9. M. H. Kolekar, K. Palaniappan, S. Sengupta and G. Seetharaman, “*Video Event Detection and Semantic Identification Using Bayesian Belief Networks*”, in workshop of IEEE Int. Conf. on Computer Vision (**ICCV**), Kyoto, Japan, Sept 2009
10. M. H. Kolekar, K. Palaniappan, “*A Hierarchical Framework for Semantic Scene Classification in Soccer Sports Video*”, in Proc. of IEEE Region Ten Int. Conf. (**TENCON**), India, 2008
11. M. H. Kolekar, K. Palaniappan and S. Sengupta, “*A Novel Framework for Semantic Annotation of Soccer Sports Video Sequences*”, in the 5th IET European Conference on Visual Media Production (**CVMP**), London, UK, 2008
12. M. H. Kolekar, S. Sengupta, “*Semantic Concept Extraction from Video for Highlight Generation*”, in Proc. of ACM Int. Conf. on Mobile Multimedia Communication (**Mobimedia**), Italy, Sept 2006
13. M. H. Kolekar, S. Sengupta, “*Event-importance based customized and automatic cricket highlight generation*”, in Proc. of IEEE Int. Conf. on Multimedia and Expo (**ICME**), July 2006

14. M. H. Kolekar, S. Sengupta, "Keyword-Based Automatic Event Indexing of Cricket Videos For Fast Retrieval", in Proc. of Int. Conf. on Emerging Applications of IT (**EAIT**) (sponsored by IEEE), ISI Kolkata, Feb 2006
15. M. H. Kolekar, S. Sengupta, "A Hierarchical Framework For Generic Sports Video Classification", in Proc of Asian Conference on Computer Vision (**ACCV**), Hyderabad, India, Jan 2006
16. M. H. Kolekar, S. Sengupta, "Semantic Indexing of News Video Sequences: A Multimodal Hierarchical Approach Based on Hidden Markov Model", in Proc. of IEEE International Region 10 Conference (**TENCON**), Melbourne, Australia, Nov 2005
17. M. H. Kolekar, S. Sengupta, "A Concept-oriented Hierarchical Framework for News Video Classification, Indexing and Browsing", in Proc. of Second Indian International conference on Artificial Intelligence (**IICAI**), pp. 3025-3035, Pune, India, Dec 2005
18. M. H. Kolekar, S. Sengupta, "Hierarchical structure for audio-video based semantic classification of sports video sequences", in Proc. of Int. Conf. on Visual Communications and Image Processing (**VCIP**), SPIE-5960/ 401-409, Beijing, China, July 2005
19. M. H. Kolekar, S. Sengupta, "Event Detection based on Audio for Cricket Highlight Generation", in Proc. of International Symposium on Frontiers of Research on Speech and Music, pp. 128-131, Bhubaneswar, India, Jan 2005
20. M. H. Kolekar, S. Sengupta, "Fast Video Summarization based on Key frame Extraction Technique", in Proc. of IASTED's International Conf. on Computer, Internet and Information Technology, pp. 561-564, Scottsdale, Arizona, USA, Nov 2003
21. M. H. Kolekar, "Transmission of Highlight Clips of a Live Cricket match on Mobile Phones", in Proc. of IET Int. Conf. on Wireless Mobile and Multimedia Networks, 2008
22. S. Rajput, M. S. khadtare, A. J. Patankar, M. H. Kolekar, "Real-time Speech Scrambling and descrambling in Time and Frequency Domain", Int. Conf. on Computer Networks and Security, Pune, India, 2008
23. M. H. Kolekar, A. J. Patankar, Y. R. Joshi "Rich Internet Application's Security Enhancement", Int. Conf. on Computer Networks and Security, Pune, India, 2008
24. M. H. Kolekar, A. J. Patankar, M.K. Nighot, "String Matching Engine for Intrusion Detection and Prevention", ACM Int. Conf. Advance Computing, Chikli, MS, India, Feb 2008
25. M. H. Kolekar, K. Palaniappan, S. Sengupta, "Semantic Event Detection and Classification in Cricket Video Sequences", in Proc. of IEEE Indian Conf. on Vision, Graphics and Image Processing (**ICVGIP**), Bhubaneswar, India, Dec 2008
26. M. H. Kolekar, S. Sengupta, "Caption Content Analysis Based Automated Cricket Highlight Generation", in Proc. of National Conf. on Communication (**NCC**), IIT Mumbai, India, Jan 2008
27. M. H. Kolekar, S. Sengupta, "Adaptive Likelihood Boosting Approach for Semantic Classification of Sports Video Sequences", in Proc. of National Conf. on Communication (**NCC**), IIT Delhi, India, Jan 2006

28. M. H. Kolekar, S. Sengupta, "Video Shot Boundary Detection: A Comparative Study of Three Popular Approaches", in Proc. of National Conference on Communication (**NCC**), pp. 419-423, I.I.Sc, Bangalore, India, Jan 2004
 29. M. H. Kolekar, S. Sengupta, "Hidden Markov Model Based Structuring of Cricket Video Sequences Using Motion and Color Features", in Proc. of Indian Conf. on Vision, Graphics and Image Processing (**ICVGIP**), pp. 632-637, ISI Kolkata, Dec 2004
 30. M. H. Kolekar, S. Sengupta, "Hidden Markov Model based Video Indexing with Discrete Cosine Transform as a Likelihood Function", in Proc. of IEEE **INDICON** conference, IIT Kharagpur, India, Dec 2004
 31. M. H. Kolekar, "Hidden Markov Model based Highlight Generation of Cricket Video Sequence using Video and Audio Cues", in Proc. of Computer Society of India's Conf on IT++: The Next Generation, pp. 249-258, India, Dec 2004 [Received best student paper award]
 32. M. H. Kolekar, S. Sengupta, "Clustering of Video Shots Based on Color Histogram Features for Video Summarization", in Proc. of IEEE **ACE** Conference, Pune, India, Dec 2003
 33. M. H. Kolekar, A. Patil, "Texture segmentation using Optimized Gabor Filter", in Proc. of All India Seminar on Recent Trends in Computer Communication Networks (**CCN**), pp. 55-63, IIT Roorkee, Nov 2001
 34. M. H. Kolekar, S. N. Talbar, "Potential of Telemedicine and E-Health for Rural India", in Proc. of National Conference on Medical Informatics, pp. 35-39, Vijaywada, AP, India, Nov 2000
 35. A. S. Rumale, A. J. Patankar, M. H. Kolekar, "Motion Detection using Sum of Absolute Difference Algorithm", National conf. on Advanced Image Processing and Networking, Kovillpati, Tamilnadu, India, 2009
 36. A. S. Rumale, A. J. Patankar, M. H. Kolekar, "Object Tracking Algorithm for Sequential Images Acquired From a Video Using Key Point Detector", National Conference on Challenges and Opportunities in Information Technology and Bioinformatics, Udgir, Nanded, MS, India, 2009
 37. A. S. Rumale, A. J. Patanakar, M. H. Kolekar, "Object Detection Using Fuzzy Logic in Video Surveillance System", National Conference on Distributed Computing, Osmanabad, MS, India, 2009
 38. S. Jagdale, M. H. Kolekar, "Computer Aided Diagnosis System for Breast Cancer Detection using Neural Network", National Conf. on Information Science, Manipal, Karnataka, India, 2009
 39. A. S. Rumale, A. J. Patankar, M. H. Kolekar, "Image Text Detection Using Directional Edge kernels", IETs National Conference on Signal and Image Processing Applications, College of Engineering Pune, India, Sept 2009.
- Book**
40. M. H. Kolekar and S. Sengupta, "Image and Video Processing", under *ISTE Learning Material Programme* for B. Tech level students [in progress].

Personal information

Name: Dr. Maheshkumar H. Kolekar
Languages: English, Germany, Hindi, Marathi
Date of Birth: Feb 28, 1972

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References

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2. **Prof. Subhasis Chaudhuri**, Professor and Head,
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