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Education

PhD. Computer Science December 2003
University of Central Florida, Orlando, FL.
Thesis Title: "Video Categorization using Semantics and Semiotics".
Advisor: Dr. Mubarak Shah

B.S. Electrical Engineering July 1998
NED University of Engineering and Technology
Karachi, Pakistan.

Publications

- Book Chapters** 1. "Video Categorization using Semantics and Semiotics",
In Video Mining Techniques
Editors: Daniel DeMenthon, David Doermann, Azriel Rosenfeld
KLUWER Academic Publishers, 2003.
- Journal Papers** 2. "Classification Of Hollywood Genres From Previews",
Rasheed Z and Shah M.
IEEE Transactions on Circuit and Systems for Video Technology (under publication).
3. "Visual Content Based Segmentation of Talk and Game Shows",
Javed O, Khan S, Rasheed Z and Shah M.
International Journal of Computers and Applications (ACTA press), June 2002.
- Conference Papers** 4. "Scene Detection In Hollywood Movies and TV Shows",
Rasheed Z and Shah M.
IEEE Computer Vision and Pattern Recognition Conference, Madison, Wisconsin, June
16-22 2003 (*accepted for oral presentation*).
5. "Conversation Detection in Feature Films Using Finite State Machines",
Zhai Y, Rasheed Z, Shah M.
17th International Conference on Pattern Recognition, 2004.
6. "A Framework for Semantic Classification of Scenes Using Finite State Machines",
Zhai Y, Rasheed Z, Shah M.
Int. Conf. on Image and Video Retrieval, July 21-23, 2004 (*accepted for oral presentation*).

7. "M-KNIGHT: A Real-time Surveillance System for Multiple Overlapping and Non-overlapping Cameras",
Javed O, Rasheed Z, Alatas O and Shah M.
IEEE International Conference on Multimedia and Expo, Baltimore, MD, July 6-9 2003.
8. "Movie Genre Classification By Exploiting Audio-Visual Features Of Previews",
Rasheed Z and Shah M.
The 16th IEEE International Conference on Pattern Recognition, Québec City, Canada,
August 11-15 2002, Volume 2, Page(s) 1086 –1089.
9. "Human Tracking in Multiple Cameras",
Khan S, Javed O, Rasheed Z and Shah M.
The Eighth IEEE International Conference on Computer Vision, Vancouver, Canada.
July 9-12 2001, Volume 1, Page(s) 331 –336.
10. "A Framework for Segmentation of Talk & Game Shows",
Javed O, Rasheed Z and Shah M.
The Eighth IEEE International Conference on Computer Vision, Vancouver, Canada.
July 9-12 2001, Volume 2, Page(s) 532 –537.
11. "A Framework for Segmentation of Interview Videos",
Javed O, Khan S, Rasheed Z and Shah M.
IASTED International Conference on Internet and Multimedia Systems and
Applications, Las Vegas, Nov 20-23 2000.

Workshop Papers

12. "Camera handoff: Tracking in Multiple Uncalibrated Stationary Cameras",
Javed O, Khan S, Rasheed Z and Shah M.
IEEE Workshop on Human Motion, Austin, Texas, 2000, Page(s) 113 –118.

Working Experience

Video Scientist (September 2003-present)

Assignments: Developing and testing algorithms for Human Video Surveillance. In particular, tracking in single and multiple cameras and event detection.

Teaching Experience

Advanced Computer Architecture (Fall 2001-Summer 2002)

(Graduate level course)

Assignments: Grading homework and exams, holding office hours, delivering class lectures.

Computer Vision (Spring 2002)

(Graduate level course)

Assignments: Grading homework, helping students in programming assignments.

Computer Fundamentals for Business (Spring 2000-Summer 2001)

Assignments: Delivering lectures, holding office hours and conducting labs.

Object Oriented Programming in Java (Fall 2002-Spring 2003)

Assignments: Lab Instructor, grading assignments.

Technoman Institute of Electronics Karachi, Pakistan (1997-1998)

Instructor of Electronics.

Assignments: Delivering lectures, conducting labs, helping students in senior design projects.

Research Experience

Army STRICOM Project

Visual Tracking for Individual Combatant Simulation (Fall 2002-2003).

Worked as Graduate Research Assistant with Dr. Mubarak Shah.

Implementation of tracking and activity recognition algorithms in real time for indoor surveillance system.

Lockheed Martin Project

Worked as a Graduate Research Assistant with Dr. Mubarak Shah.

Implementation of Multiple Camera Tracking System in real time.

Internship at Siemens Pakistan (June - August 1997)

Worked at Siemens Pakistan for three months as an internee. Designed an automatic battery recharging system for high-power diesel generators.

Research Projects

Temporal Segmentation of Videos: Learning and Exploiting Structure in Videos

We consider popular TV interviews and game shows, assuming that the entire collection of shows has been digitized, and address the problem of how to organize each show so that it is suitable for browsing and retrieval. We consider that the user may be interested to look at only interview segments without the commercials. Perhaps the user wants to view only clips which record the questions asked during the show or may want to see only clips which record the answers of the interviewee. For example, the user might be motivated only to watch the questions in order to get a summary of the topics discussed in a particular program. We have developed techniques to separate commercials from interview segments and to further classify interview segments as shots of the host and shots of the guests.

<http://www.cs.ucf.edu/~vision/projects/LarryKing/LarryKing.html>

Movie Genre Classification from Previews

We address the issue of classifying Hollywood movies into genres on the basis of audio-visual cues in the previews. A preview contains several interesting and important events of the movie and hence provides suitable information to perform genre classification. In our approach, we initially classify the movies into *action* and *non-action* categories. In the next step, color and audio attributes of previews are explored. We exploit the gray scale information of key-frames and combine with *cinematic principles* to sub-classify non-action movies into *comedy*, *horror*, and *drama/other* genres. Finally, the audio signal and color information of previews of *action* movies are analyzed to find *explosions/gunfire* in the previews. Our work is a step towards automatically building and updating video databases with minimum human intervention. Our approach can also be broadened for potential applications including browsing and retrieval of videos on the *Internet*, *video libraries*, and rating of the movies from a given set of large collection of un-rated movies.

<http://www.cs.ucf.edu/~vision/projects/movieClassification/movieClassification.html>

Scene Segmentation in Hollywood Movies and TV Shows

Finding scenes in a video is a problem of shot clustering based on some matching criteria, for example, color similarity. A scene can be defined as one of the subdivisions of a play in which the setting is fixed (employing color similarity), or when it presents continuous action in one place (employing motion content and shot length similarity). We present a method to perform a high level segmentation of videos into scenes by proposing a novel two-pass algorithm for scene boundary detection. We utilize the motion contents and shot length together with the color properties of shots as features. We also propose a method to describe the content of each scene by selecting one representative image from the video that results in a compact representation of huge videos in a small number of key frames. The segmentation of video data into number of scenes also facilitates an improved browsing of videos in electronic form, such as *Video on Demand*, *Digital Libraries*, *Internet*. Recently, DVDs are available with chapter selection option where each chapter is represented by an image. Our algorithm can be used to automate this objective by first finding the scenes and then selecting a representative image for every scene. The proposed algorithm has been tested on a variety of videos including Hollywood movies, sitcoms and interview programs and promising results have been obtained.

Tracking in Multiple Cameras with Overlapping Fields of View

We address the issue of tracking moving objects in an environment covered by multiple uncalibrated cameras with overlapping fields of view, typical of most surveillance setups. In such a scenario, it is essential to establish correspondence between tracks of the same object, seen in different cameras, to recover complete information about the object. We employ the novel approach of finding the limits of field of view (FOV) of a camera as visible in the other cameras. Using this information, we are able to establish 'equivalences' between views of an object seen in different cameras. We are also able to compute the set of cameras in which an object will be visible, using FOV lines. This approach is very fast and simple, compared to camera calibration approaches that are based on computing 3D coordinates. Once correspondence is established between tracks of objects, we can use that information in a number of ways, including correcting errors in single camera tracking, resolving occlusion ambiguities, and generating 'object-based' sequences showing the complete history of the object as it travels between cameras. We present results on indoor and outdoor sequences, containing persons and vehicles. This algorithm has also been implemented in real time.

<http://www.cs.ucf.edu/~vision/projects/multipleCameras/multiple-cameras.html>

Other Research Projects

I have also worked on following projects:

- **Face Feature Detection:** Detection of face features for example eyes, nose, lips etc. in gray scale images.
- **Activity Recognition:** Recognizing activities performed by humans in indoor environment for surveillance.
- **Occlusion Resolution:** Correct labeling of multiple objects during occlusion. An important problem encountered in many tracking algorithms.

Advanced Courses Taken

- Design and Analysis of Algorithms
- Advanced Computer Architecture
- Advanced Computer Vision
- Operating Systems Design Principles
- Computer Understanding of Natural Languages
- Pattern Recognition
- Theoretical Statistics

Professional Activities

Journal Article Referring

- IEEE Transactions on Pattern Analysis and Machine Intelligence
- International Journal of Computer Vision
- International Journal of Machine Vision and Applications
- Pattern Recognition

Conference Article Referring

- IEEE International Conference on Computer Vision (ICCV)
- IEEE Computer Vision and Pattern Recognition (CVPR)
- International Conference on Pattern Recognition (ICPR)
- Asian Conference on Computer Vision

Web Administrator for Computer Vision Lab at UCF

I have been managing the website for Computer Vision Lab as a web administrator for last two years. I also manage the project websites of our research group consisting of 19 graduate students and several undergraduate students.

Please visit <http://www.cs.ucf.edu/~vision>

Fellowships

Awarded Hillman Fellowship for Excellence in Research in the Ph.D. Program Computer Science, May 2001.