Shiva Rudrani | Indian Institute of Technology Madras

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EDUCATION

Program	Institution	CGPA	Year of completion
MS (by research) CSE	Indian Institute of Technology Madras, Chennai	9.33/10	2012
MCA, CSE	National Institute of Technology Calicut, Kerala	8.93/10	2008

AREA OF INTERESTS

Computer Vision, Machine Learning

PUBLICATIONS

- Publication related to MS Thesis **(2009-2012)**
  - S. Rudrani, S. Das and S. Samanta. **Eigen Scale Space (ESS) for Face Recognition from Blurred Images for Surveillance Application.** Recommended for revision in **IEEE Transactions on Image Processing**, Nov. 2012.
  - S. Rudrani and S. Das**. Face Recognition on Low Quality Surveillance Images, by Compensating Degradation.** International Conference on Image Analysis and Recognition (**ICIAR 2011, Part II**); Burnaby, BC, Canada, **LNCS**, 2011, Volume 6754/2011, 212-221.
  - S. Rudrani and S. Das. **Face Recognition with Real-world Images Acquired from an Outdoor Surveillance Camera by Compensating Degradation.** Proceedings of the Centenary Conference –EE (**CCEE**), IISc, Bangalore, India, 2011, pp. 409-414.
- Publication related to MCA final year project **(2008-2009)**
  - S. Rudrani and S. Nazeer. **Top-k query processing with multidimensional range search. IEEE**, International Conference on Methods and Models in Computer Science (**ICM2CS**), 2009.

WORK EXPERIENCE

Symantec Software India Pvt. Ltd. **(May 14, 2012 to till date)**

Role: - Associate Software Engineer
Product: - NetBackup

University of Southern California **(May 17, 2011 to July 15, 2011)**

Role: - Intern

SCHOLASTIC ACHIEVEMENTS

- Recipient of **Viterbi-India Program Awards, 2011**
- Finalist for **Google Women in Engineering Award, 2011**
- Over all MCA **Second Topper**
- **Proficiency Award** in NITC for being **Topper** in 4th semester of MCA

COURSE WORK

- Computer Vision, Machine Learning, Pattern Recognition
- Operating Systems, Distributed Computing, Compiler Construction
- Advance Data structure and Algorithms, Design and Analysis of Algorithms, Theory of Computation
- Probability and Statistics, Linear Algebra, Computational Combinatorics and Graph Theory, Discrete Computational Structures

LABS

- Programming Lab
- Compiler Lab
- Advance Programming Lab
- Operating System Lab

SKILLS

- Programming : - C, C++, MATLAB
- Open Source: - openCV, openNI
- Other tools:- LATEX, LEX, YACC, Microsoft Visual Studio, Eclipse

PROJECTS

- **Eigen Scale Space (ESS) for Face Recognition from Blurred Images for Surveillance Application**
  (July 2011- Mar 2012)

Face images captured by surveillance cameras are usually confronted with blur, which significantly limits the performance of face recognition systems. Under this work we propose a novel concept of Eigen Scale Space (**ESS**) for recognizing faces degraded by blur. Inferring the parameter of a **PSF** for blur, from a single facial image is an ill-posed problem. Therefore, we propose a deterministic approach to simulate blur on training samples. The main contribution of this work is to compensate blur using a novel **ESS** method, without deblurring of face images. **ESS** is created by projecting the gallery of training samples at different scales (blur of PSF) on an eigen-space. The evolution of the mean of the class scatter for each subject in ESS creates a non-linear manifold, as the blur (scale) is gradually increased. To implicitly capture the subject-specific (i.e. unique) non-linearity and separability between manifolds in ESS, we present an algorithm to match the same when presented with a query test image of unknown blur. This is performed by projecting all the samples from **ESS** to **KDDA** (Kernel Direct Discriminant Analysis) subspace and then match (with query) based on nearest neighbour. As most benchmark face databases are obtained in a controlled environment, we have acquired a face surveillance database (**IITM-SURV**), specifically for this purpose. Experiments on three databases (**FERET**, **ORL**, **IITM-SURV**) with artificially degraded out-of-focus blur, show that our method substantially improves the recognition performance compared to a few existing **FR** methods.

- **3D Face Recognition on Depth Video (during Internship at USC under the supervision of Prof. Gerard Medioni)**

  (May 2011- July 2011)

  The goal of this project was to develop an online system for 3D face recognition using depth videos obtained from RGB-D sensors. Two modules: - Enrollment and Recognition were developed. For enrollment, using a given face detection module, subject's 3D face data was to be saved in the database (to be used later during recognition). Recognition module has two parts: -

  (a) Registration of online captured data (called model) with the data stored in database. For this we used GPU based implementation of the EM-ICP (Expectation Maximization iterative closest point) algorithm.

  (b) Computation of error/similarity measure for recognition. This module used the aligned data and model along with 3D kd- tree range search algorithm for computation of similarity between data and model.

- **Face Recognition on Low Quality Surveillance Images by Compensating Degradation**

  (July 2009-July 2011)

  Face images obtained by an outdoor surveillance camera, are often confronted with severe degradations (e.g., low-resolution, low-contrast, blur and noise). This significantly limits the performance of face recognition (FR) systems used for binding "security with surveillance" applications. This work presents a framework to overcome the degradation for such images obtained by an outdoor surveillance camera, to improve the performance of FR. Two measures are defined based on the difference in intensity histograms and entropies of the gallery (large resolution, good contrast samples) and probe (with very low resolution, poor contrast and blur) images, to estimate the amount of degradation. Super-resolution techniques which are used to increase the image resolution of face samples, fail in these situations due to large difference (ratio) of the resolutions. We hence propose a combination of partial restoration (using super-resolution) of probe samples and degradation of gallery, to provide superior performance in FR. PCA (Principal component analysis) and FLDA (Fisher Linear Discriminant Analysis) have been used as baseline face recognition classifiers. The aim is to illustrate the effectiveness of our proposed method of compensating the degradation in surveillance data, rather than designing a specific classifier space suited for degraded test probes. The efficiency of the method is shown by an enhancement of the face classification accuracy, while comparing results obtained separately using training with acquired indoor gallery samples and then testing with the outdoor probes.

- **Top-k query processing with multidimensional range search** (**MCA Final Year Project**)

  (July 2007 – March 2008)

  An *m*-dimensional top-k query (with *m* search conditions) is primarily processed by scanning the corresponding *m* index lists in descending score orders in an interleaved manner (and by making judicious random accesses to look up index entries of specific data items). In this work a new algorithm is proposed that makes use of a data structure that facilitates multidimensional range search. An *m*-dimensional top-k query can be processed by searching for the data items that satisfies a range of score over each dimension. At every step of the algorithm a new set of ranges (one for each dimension) is specified such that more accurate tuples are added in the candidate top-k set. The process continues till we get the actual top-k data items. The incremented range set is specified with the help of the statistics of the distribution of data items in *m*-dimensional space. Thus, efficiency of the algorithm very much depends on the proper study and analysis of the distribution of the data items in the *m*-dimensional space and the data structure used.

CO-CURRICULAR ACTIVITIES

- **Author Participant, International Conference on Image Analysis and Recognition (ICIAR'11)**
  (June 22-24, 2011)

- **Participant, Seventh Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP'10)**
  (Dec 12-15, 2010)

- **Participant, Yahoo Machine Learning Summer School** **(June 14-19, 2010)**

- **Participant, Third International Conference on Pattern Recognition and Machine Intelligence (PReMI'09)**
  (Dec 16-20, 2009)