Manasi Datar

image analysis | AI | computer vision

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Personal Work

Summary

I am a research scientist at Siemens Healthineers with experience in the areas of image analysis, statistical modeling, and artificial intelligence (DL/ML). My expertise in research methodology and technical project management combine to drive innovation and positive outcomes across multiple projects.

Education

2013 | **PhD, Computing @ University of Utah**
2008 | Dissertation : Statistical analysis of ensembles of nonregular shapes
Advisor : Dr. Ross Whitaker

2005 | **MS, Computer Science @ Utah State University**
2002 | Thesis : Natural Scene Segmentation using Information Fusion and Hierarchical Self-Organizing Maps
Advisor : Dr. Hengda Cheng

2002 | **BE, Computer Engineering @ University of Mumbai**
1998 |

Employment

- | **Senior Specialist, Research & Technology @ Siemens Healthineers (Digital Technology & Innovation)**
2023 | Topics : TBD

2023 | **Research Scientist @ Siemens Healthineers (Digital Technology & Innovation)**
2014 | Topics : DL/ML, image segmentation, pathology detection/characterization, interactive editing

2014 | **Software Developer @ 1000shapes GmbH**
2014 | Topics : statistical shape modeling, image segmentation, 3D reconstruction, surgical planning

2013 | **Research Assistant @ University of Utah (SCI Institute)**
2008 | Topics : statistical shape modeling, shape regression, longitudinal shape analysis

2008 | **Research Scientist @ GE Global Research (Imaging Technologies)**
2005 | Topics : ML, image segmentation, multi-modality image registration

Honors and Awards

2024 | Siemens Healthineers CEO Performance Stock Award (×4)
2021 | *(outstanding performance in corresponding FY)*

2013 | Top10 best poster @ SCIx *(title : Shape analysis for Orthopedics)*

2007 | Dushman Award - highest team technical award at GE Global Research *(for contributions to PET VCAR)*

Research Experience (selected topics)

- 2023 **Uncertainty estimation for segmentation**
  - Bayesian methods for epistemic uncertainty estimation
  - Statistical methods for maximal use of in-distribution data to estimate uncertainty metric distribution

  explainable AI | Bayesian methods | deep ensembles | uncertainty estimation | technical project management

- 2016 **X-ray/mammography/DBT image analysis**
  - Integration of inter-reader agreement for AI based breast density classification
  - Low dimensional representation for pectoral muscle segmentation in mammography images
  - Knowledge distillation using MLE-based loss weights for model compression and faster inference
  - Explainable AI methods for positioning check in X-ray images
  - Intelligent o'clock positioning of breast lesions : syngo.Breast Care

  explainable AI | image segmentation | knowledge distillation | decision support | technical project management

2023 2021 **Multi-modal analysis for oncology**
- Optimized annotation of metastases of pancreatic, colorectal cancer in the liver using DL models
- Prediction of pancreatic cancer progression and survival using longitudinal imaging studies
- Therapy response prediction by combining baseline imaging and clinical data for colorectal cancer
- Project pages : EuCanImage website PANCAIM website

artificial intelligence | pathology detection/characterization | response/survival prediction | technical project management

2019 2017 **Intelligent organ contouring for radiation therapy**
- Evaluation of DL model for automatic organ contouring
- Methods for semi-automatic, interactive editing of organ contours
- Reinforcement learning to improve contour accuracy based on user intent

deep learning | image segmentation | reinforcement learning

2017 2014 **Analysis of pediatric cardiomyopathies and cardiovascular disease risk**
- ML based structural segmentation of for personalized cardiac modeling
- DL based deformable registration via shape matching
- Personalized cardiac models for longitudinal analysis of pediatric cardiomyopathies
- Project summary : MD-Paedigree final newsletter

deep learning | image segmentation | deformable registration | longitudinal analysis

2013 2008 **Statistical analysis of ensembles of nonregular shapes**
- Modeling highly curved surfaces using isometry invariant correspondences and feature entropy
- Constrained models for open surfaces using simple geometric primitives
- Linear shape regression model to characterize shape changes over time
- High-dimensional linear mixed-effects shape model for longitudinal analysis
- Some features included in software : ShapeWorks

statistical shape models | shape regression | linear mixed-effects model | longitudinal analysis

2008 2006 **Multi-modality image registration**
- Fast and efficient multi-modality image registration for assisted reading : PET VCAR
- Anatomy specific transformations for improved full-body image registration
- Constrained deformable image registration based on anatomic material properties

image registration | deformable registration | longitudinal analysis

2008 2003 **Perceptually consistent image segmentation**
- Hierarchical self-organizing map architecture for segmentation using color and texture features
- Application to automated image orientation detection, tissue segmentation for prostate cancer analysis

machine learning | image segmentation | image classification

Publications (selected, not all as first author)

2024
- Computer-implemented method for providing a positioning score regarding a positioning of an examining region in an x-ray image [EP4345742A1]
- Method for detection and characterization of lesions [US20240104722A1]
- Building a machine-learning model to predict sematic context information for contrast-enhanced medical imaging measurements [EP4343786A1]
- Multi-task machine learning network [EP4339837A1]
- Improved pectoral muscle segmentation in mammograms through regression-based deep learning and knowledge distillation *[accepted at ISBI]*

2023
- AI driven longitudinal liver focal lesion analysis [US20230237647A1]
- System and method for differentiating a tissue of interest from another part of a medical scanner [US20230079774A1]
- Integration of Inter-Rater Agreement in AI-System Training and Testing for Mammographic Breast Density Classification [ECR]

2022
- A deep image-to-image network organ segmentation algorithm for radiation treatment planning : principles and clinical evaluation [RADIAT ONCOL]

2017
- Longitudinal Analysis using Personalised 3D Cardiac Models with Population-Based Priors : Application to Paediatric Cardiomyopathies [MICCAI]
- SVF-Net : Learning Deformable Image Registration Using Shape Matching [MICCAI]
- Longitudinal Parameter Estimation in 3D Electromechanical Models : Application to Cardiovascular Changes in Digestion [FIMH]

2016
- Entropy-based particle correspondence for shape populations [IJCARS]

2015
- Propagation of Myocardial Fibre Architecture Uncertainty on Electromechanical Model Parameter Estimation : A Case Study [FIMH]

2013
- Statistical Shape Modeling of CAM Femoroacetabular Impingement [JOR]
- Geodesic distances to landmarks for dense correspondence on ensembles of complex shapes [MICCAI]
- Toward an understanding of the short bone phenotype associated with multiple osteochondromas [JOR]

2012
- Mixed-Effects Shape Models for Estimating Longitudinal Changes in Anatomy [STIA]
- Combined SPHARM-PDM and Entropy-based Particle Systems Shape Analysis Framework [SPIE-MI]

2011
- Geometric Correspondence for Ensembles of Nonregular Shapes [STIA]
- Segmentation of tissue images using color and texture [US7949181B2]

2009
- Particle Based Shape Regression of Open Surfaces with Applications to Developmental Neuroimaging [MICCAI]

2008
- Color and Texture Based Segmentation of Molecular Pathology Images using HSOMs [ISBI]
- Deformable Registration with Spatially Varying Degrees of Freedom Constraints [ISBI]

2007
- System and method for geometry driven registration [US20070280556A1]

2006
- Natural Scene Segmentation Based on Information Fusion and Homogeneity Property [JCIS-CVPRIP]
- Automatic Image Orientation Detection Using the Supervised Self-Organizing Map [IASTED SIP]