Sudhir Sornapudi

https://sdhir.github.io
ssbw5@mst.edu

Education

Missouri University of Science and Technology (Rolla, MO) — July 2020
Ph.D., Computer Engineering — **GPA: 3.8/4.0**
Dissertation: Deep Learning for Digitized Histology Image Analysis

Missouri University of Science and Technology — April 2017
M.S., Computer Engineering — **GPA: 4.0/4.0**
Thesis: Nuclei Segmentation of Histology Images Based on Deep Learning and Color Quantization and Analysis of Real-World Pill Images.

JNTU Kakinada - University College of Engineering Vizianagaram (India) — May 2014
B.Tech., Electronics and Communications Engineering — **GPA: 3.8/4.0**

Industry Experience

Corteva Agriscience — Johnston, IA
Associate Imaging Scientist, R&D — May 2020 – Present

- Understanding the challenges facing predictive analytics in agriculture and propose imaging and computer vision-based research solutions to improve, enhance or modify the existing processes to generate accurate and reliable information to the clients and end-users.
- Developed a containerized solution and software deployment using tools such as Docker or Kubernetes developed on Unix/Linux based operating systems.
- Designed scalable systems to process large image and video datasets for deep neural network architecture on AWS instances using multi core, GPU based instances.
- Conducted meetings with clients and project stake holder regularly to update them with findings and progress on proposed image analytic solutions.
- Presented research findings and proposed solutions at internal and external venues to share and disseminate knowledge.

MilliporeSigma, Merck KGaA — St. Louis, MO
Computer Vision Intern — May 2019 – Aug 2019

- Designed a prototype to automatically update digital inventory by scanning images of chemical reagents.
- Implemented deep learning based text detection and recognition modules to extract information from the labels attached to the chemical reagents.
- The model helps scientists to onboard and update inventory within seconds.
- Contributed to Brightlab team at hackathon event by detecting the weights from the images of a digital balance.

U.S. National Library of Medicine, NIH, HHS — Bethesda, MD
Research Scientist Intern — Aug 2018 – Dec 2018

- Designed a pipeline to read raw cervical cytology raw slide images and produce clean high-resolution annotated patch data.
- Implemented a novel graph-based approach to detect nuclei and cell boundaries from complex overlapping cell images.
- Evaluated and analyzed various CNN models to classify and differentiate abnormal cell images from collection of normal cell images.

Xyken LLC McLean, VA
Software (Image Processing) Intern May 2018 – Aug 2018

- Implemented a customized region-based CNN model for performing instance segmentation and detection on colonoscopy and wireless capsule endoscopy (WCE) polyp frames.
- Designed a tool to annotate capsule endoscopy videos.
- Worked on skin segmentation of foot image frames, extracted from a user video, using a deep neural network and Gaussian mixture model to ultimately recreate a 3D model of a foot for foot prosthesis.
- The skin segmentation approach is directly incorporated in the Xyken's iDr 3D android mobile application.

Academic Experience

Missouri University of Science and Technology Rolla, MO
Graduate Research Assistant, Image Processing Laboratory Nov 2015 – Jul 2020

- **Image Analysis and Object Recognition.** Perform research into software design and development involving image processing and feature extraction for automated nuclei detection in microscopy histology slide images using novel algorithms involving computer vision and computational intelligence imaging techniques.
- **Deep Learning and Pattern Recognition.** Investigate computational intelligence paradigms for automatic Cervical cancer image recognition. Develop novel and hybrid artificial intelligence algorithms to improve microscopic image analysis for nuclei identification, epithelium detection, segmentation and classification using Machine learning, Clustering, Convolutional Neural networks and Recurrent Neural Networks with Attention Mechanism.
- Hands on experience with data collection, feature selection, data training and evaluation.

Graduate Teaching Assistant, Digital Electronics Laboratory Aug 2016 – May 2020

- Taught Digital Logic (CpE 2211) and Microcontrollers (CpE 3151) laboratory course.
- Delivered a range of teaching and assessment activities including tutorials for students.
- Provided effective timely and appropriate feedback to students to support their learning.
- Teaching topics include AVR microcontroller, assembly language programming and embedded C programming; and digital logic design and analysis using Atmel Studio, Altera Quartus II, Model Sim (firmware) and FPGA (hardware).

Expertise

Background in Image Processing, Computer Vision, Deep Learning and Statistical Analysis.

Languages:	Python, C, C++, Java, Embedded C, VHDL, HTML
OS platforms:	Linux, Windows, macOS, GCP, AWS
Tools:	Matlab, OpenCV, Pandas, Weka, Eclipse, Visual Studio
DL frameworks:	PyTorch, Tensor Flow, Theano, and Keras (multi-GPU).
Architectures:	Docker, Kubernetes, MaaS, Kubeflow
Big Data Analytics:	Hadoop, Map Reduce, HBase, MongoDB, Pig, Mahout

Publications

Sudhir Sornapudi, Ravitej Addanki, R. Joe Stanley, William V. Stoecker, Rodney Long, Sameer Antani, Rosemary Zuna, Shelliane R. Frazier. "Fully Automated End-to-end Cervical Histology Whole Slide Image Diagnosis Toolbox". Under review. Submitted to Journal of Pathology Informatics.

Sudhir Sornapudi, R. Joe Stanley, William V. Stoecker, Rodney Long, Zhiyun Xue, Rosemary Zuna, Shelliane R. Frazier, Sameer Antani. "DeepCIN: Attention-based Cervical Histology Image Classification with Sequential Feature Modelling for Pathologist-Level Accuracy". Under review.

Submitted to Journal of Pathology Informatics.

Rajaraman, S., **Sornapudi, S.**, Alderson, P. O., Folio, L. R., & Antani, S. K. (2020). “Interpreting Deep Ensemble Learning through Radiologist Annotations for COVID-19 Detection in Chest Radiographs”. *MedRxiv*. https://doi.org/10.1101/2020.07.15.20154385

Sornapudi, S., Stanley, R. J., Stoecker, W. V, Long, R., Xue, Z., Zuna, R., Frazier, S. R., Antani, S. (2020). “Feature based Sequential Classifier with Attention Mechanism”. *ArXiv*. https://arxiv.org/abs/2007.11392.

Sornapudi, S., Addanki, R., Stanley, J., Stoecker, W. V, Long, R., Zuna, R., Frazier, S. R., Antani, S. (2020). “Cervical Whole Slide Histology Image Analysis Toolbox”. *MedRxiv*. https://doi.org/10.1101/2020.07.22.20160366

Sornapudi S, Hagerty J, Stanley RJ, Stoecker WV, Long R, Antani S, Thoma G, Zuna R, Frazier SR. "EpithNet: Deep regression for epithelium segmentation in cervical histology images". J Pathol Inform 2020; 11:10. DOI: 10.4103/jpi.jpi_53_19

Sornapudi, S., Brown, G. T., Xue, Z., Long, R., Allen, L., & Antani, S. (2020). Comparing Deep Learning Models for Multi-cell Classification in Liquid- based Cervical Cytology Image. *AMIA Annual Symposium Proceedings*, *2019*, 820–827. PMID: 32308878; PMCID: PMC7153123.

Sornapudi, S.; Meng, F.; Yi, S. Region-Based Automated Localization of Colonoscopy and Wireless Capsule Endoscopy Polyps. Appl. Sci. 2019, 9, 2404.

S. Rajaraman, **S. Sornapudi**, M. Kohli and S. Antani, "Assessment of an ensemble of machine learning models toward abnormality detection in chest radiographs", 2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Berlin, Germany, 2019, pp. 3689-3692. DOI: 10.1109/EMBC.2019.8856715

Sornapudi, S., & Jain, P. (2019). “Deep Learning-based Text Detection and Recognition in the Research Lab”. Retrieved May 5, 2020, from https://www.brightlab.com/lab-automation/deep-learning-based-text-detection-and-recognition-in-the-research-lab/

Sornapudi, S., Stanley, R. J., Stoecker, W. V, Almubarak, H., Long, R., Antani, S., Frazier, S. R. (2018). Deep Learning Nuclei Detection in Digitized Histology Images by Superpixels. Journal of Pathology Informatics, 9(1), 5. DOI: 10.4103/jpi.jpi_74_17

Sornapudi, Sudhir, "Nuclei segmentation of histology images based on deep learning and color quantization and analysis of real-world pill images" (2017). Masters Theses. 7710.

Sornapudi S., Joe Stanley R., Hagerty J. and V. Stoecker W. (2017). Real-world Pill Segmentation based on Superpixel Merge using Region Adjacency Graph. In Proceedings of the 12th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications - Volume 4: VISAPP, (VISIGRAPP 2017) ISBN 978-989-758-225-7, pages 182-187. DOI: 10.5220/0006135801820187

Guo P, Stanley RJ, De S, Long LR, Antani SK, Thoma GR, Demner-Fushman D, **Sornapudi S**; Features Advances to Automatically Find Images for Application to Clinical Decision Support. Medical Research Archives. 4(7) 2016. DOI: 10.18103/mra.v4i7.761

Sudhir Sornapudi, Jason H., R. Joe Stanley, William V. Stoecker, Rodney Long, Sameer Antani, George Thoma, Rosemary Zuna, Shelliane R. Frazier. "Regression based Deep Neural Networks for Epithelium Segmentation in Histopathology Images". Poster presentation at 4th Annual Ozark Biomedical Initiative Research Symposium, Rolla, MO. September 2019.

William V. Stoecker, Haider A. Almubarak, **Sudhir Sornapudi**, Peng Guo, Jason Hagerty, R. Joe Stanley R. "Update on Microscopic Image Processing: Detecting Successively Finer Structures – Architectures, Cells, Nuclei". Poster presentation at Ozark Biomedical Initiative Symposium, Rolla, MO. August 2018.

Sudhir Sornapudi, Joe Stanley R., Hagerty J. and V. Stoecker W. "Real-world Pill Segmentation based on Superpixel Merge using Region Adjacency Graph". Oral presentation at Ozark Biomedical Initiative Symposium, Rolla, MO. August 2017.

Honors & Activities

Won the Distinguished Paper Award at AMIA 2019 Annual Symposium, Washington D.C. November 2019.

Reviewer —Scientific Reports (Nature journal), npi Digital Medicine (Nature), IEEE Access Computers in Biology and Medicine.

Speaker—Brown Bag Lecture at US National Library of Medicine (Abstract)

Open House held in Electrical and Computer Engineering Dept. at Missouri S&T

IEEE Student member