DR. SRINIVAS SRIDHARAN

Aim to bring AI/ML technologies to help solve critical problems in the biological sciences domain. 7+ years of experience in leading a team of data scientists and software engineers to build ubiquitous and low-cost digital technologies using computer vision and machine learning models that help plant breeders, agronomists, and formulation scientists advance next-generation products that meet our global customer needs.

CONTACT

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Srinivas Sridharan
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SKILLS

Programming

Python
Java
Matlab
C++
LaTeX

Operating Systems

Linux
MacOS
Windows

Software & Tools

Computer Vision
(e.g. OpenCV, Skimage, PIL, ...)
Deep Learning
(e.g. Tensorflow, Keras, PyTorch, ...)
Visualisation
(e.g. matplotlib, ploty, Bokeh ...)
Machine Learning
(e.g. Sklearn, Numpy, Scipy, Pandas ...)
Distributed Computing
(e.g. Ray, Argo, Python Dask ...)
Docker
Kubernetes

Additional skills

Web-app development experience with Python Dash, Streamlit. Experience with MySQL, MongoDB, and Elasticsearch.

Languages

English
Hindi
Tamil
German

CERTIFICATES

Coursera - ML and DL Courses
Sun Certified Java Professional
Oracle Certified SQL Developer

WORK HISTORY

2017 - Current
Corteva Agriscience
Applied Machine Learning Leader
Research, machine learning model design, programming, predictive analytical modeling, client interaction, and deployment of developed solution

2016 - 2017
Stevens Institute of Technology
Assistant Professor
Research, Teaching, Course development, and Student Advising

2008 - 2009
Infosys Technologies Limited
Programmer Analyst
Project Management, Design and Develop Data Architecture, Software Development, Software Deployment, and Production Support

2004 - 2008
Hexaware Technologies Limited
Senior Software Engineer
Software development, Requirement Consolidation, and Automated Testing

EDUCATION

2011 - 2016
Rochester Institute of Technology
Ph.D., Computing and Information Sciences
Gaze Guidance, Task-Based Eye Movement Prediction, and Real-World Task Inference using Eye Tracking

2009 - 2011
Rochester Institute of Technology
M.S., Electrical Engineering
Adaptive Subtle Gaze Guidance for Improved Mammography Training

2000 - 2004
Annamalai University
B.E., Electrical and Electronics Engineering

SELECT INVITED TALKS

- Federal University of Rio Grande do Sul - "Satellites to Sequences: Techniques and Applications of Machine Learning in Agriculture, II Plant Science Symposium, Brazil" (2021).
- University of Texas San Antonio - "From Data to Decisions: AI-ML Driven Analytics For Applications In Agriculture, Matrix AI Consortium Seminar Series, San Antonio, TX" (2020).

TOP PUBLICATIONS

- Jesse Bier, Srinivas Sridharan, Sudhir Sournapudi, Qiao Hu, Siva Kumpatla, "A Generative Adversarial Network-based method for High Fidelity Synthetic Data Augmentation", International Conference on Precision Agriculture. (2022).
- Srinivas Sridharan, Reynold Bailey, "Automatic Target Prediction and Subtle Gaze Guidance for Improved Spatial Information Recall", ACM Symposium on Applied Perception (2015).
- Srinivas Sridharan, Reynold Bailey, Ann McNamara, and Cindy Grimm, "Subtle Gaze Manipulation for Improved Mammography Training", ACM Symposium on Eye Tracking Research and Applications (2012).

SELECT PROJECTS (CORTEVA AGRISCIENCE)

A select few projects are highlighted below that briefly describe the objectives, AI/ML technologies, and project outcomes and accomplishments.

1. Image-Based Insect Assay Damage Estimation

A deep learning-based regression model was developed to accurately predict insect %damage on leaf tissue images. The RGB imaging model helps researchers to accurately estimate tissue damage and quantify insect size, its instar stage, and if it is alive or dead to validate treatment efficacy. A total of five different assays were used and the model was trained on 0.5 million original and augmented images and associated ground-truth data.

- Python Dask distributed computing was used to deploy 100+ worker pods on the Kubernetes cluster to massively augment images.
- Two deep-learning learning models were developed to estimate %damage on leaf tissue with an accuracy > 95%.
- An object detection model with Retinanet using Resnet-50 backend was trained to identify the leaf tissue and a VGG16-based regression model was developed to estimate leaf tissue damage.
- Lead a team of full-stack developers to build an web application for image upload, inference, QC, and evaluation.
- Presented this work to the Corteva leadership team in Data Science and Biotechnology. This project won an internal Hack-a-thon award and the team also published this work externally at the International Conference on Precision Agriculture in 2022.

2. Analytics for Soy Cyst Nematode Detection

Soybean cyst nematode is one of the most devastating soybean pests in the U.S. that causes a significant yield loss to growers. A custom deep learning based on a U-NET segmentation model trained on expert-annotated data to count soy cyst nematodes in the image. The model identified nematodes with eggs correctly even in a complex background containing cluttered sand and root particles.

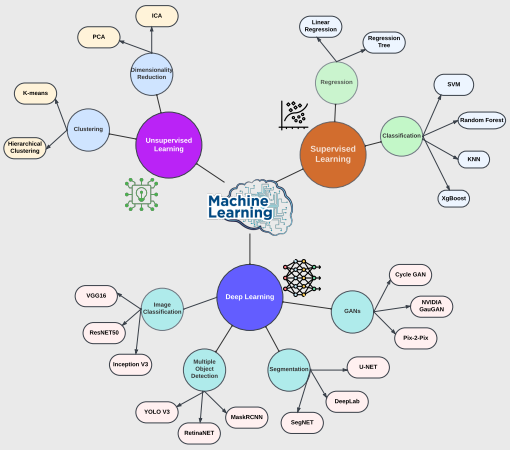
- Trained a custom U-NET model on a small dataset of fluorescence images to detect soy cysts (extremely small) that are 0.0025%px of the image area.
- Accurately detect (approx. 94%) and count the cysts among sand and root debris and consistently perform with the desired accuracy to that of an expert viewing the assay under a microscope.
- There has been no prior work in the literature that has used RGB imaging to detect soy cysts with an accuracy greater than 94%.
- Model removes any human bias and helps with consistent scores across different fields or labs in seed and crop protection development.
- Published an internal article at Corteva Agriscience and presented the work to the plant breeding and crop protection leadership team.

3. Double Haploid Embryo selection with RGB image analysis

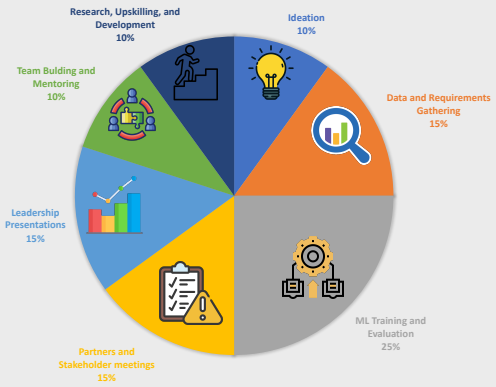
Double Haploid is an expensive process involving the rescue of embryos and evaluating them as viable or not before they are moved to the greenhouse or the field. Developed a deep-learning model to identify and label individual embryos after transfer and classify them with 98% accuracy.

- Trained 3 object detection models (Mask-RCNN, RetinaNET, EfficientDet) on 2 different image resolutions (1024x1024, 2048x2048), with 10 hyperparameters (manual selection) each on a GPU Kubernetes cluster to select the best model for IoU, F1-Score, and accuracy.
- EfficientDet model emerged as the best model with a hold-out test data accuracy of 97%, F1-Score of 98%, and mAP of 97%.
- Model deployed with Seldon-Core and a rest API for image inference.
- An XgBoost model was trained on GEBV data to predict DH selection with 92% accuracy. This model was also used to obtain a probability score to rank the DH population.
- A Python Dash dashboard was developed to train the XgBoost model on new dataset and perform inference and view plots and results.

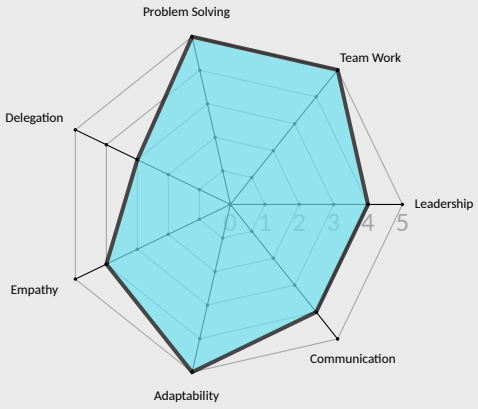
ML EXPERIENCE



WORK PIE



SOFT SKILL RADAR



REFERENCES

- Dr. Manuel Ruidiaz
- Dr. Siva Kumpatla
- Dr. Shravan Sukumar