Karthick Jayaraman

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Enabling scalable AI for use-cases in life sciences.

- Position: Research Associate in Global Seed Technology
- Role: Leading global data science projects in *Product Supply* organisation.
- Use-case: To improve genetic purity & batch quality in vegetable seeds.
- Data-type: Multi-spectral imaging for Digital phenotyping and Production data for process optimization.
- Approach: Ensemble models built in Python/R and deployed with Docker or Sagemaker.

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Relevant Projects

2022 **Batch Quality metrics in Seed Operations** — Pepper

- Built ensemble model using production data and images for batch-process decision-making in Seed Operations.
- Developed CNN (Convolutional Neural Network) in Jupyter+Tensorflow to estimate batch quality parameters.
- Constructed preliminary ETL (Extract, Transform, Load) with transition plans for using AWS for lean MLOps.

2021 **Digital Solutions for quality bottlenecks in seed production** — Cucurbits

- Improved seed quality and genetic purity using Imaging & Machine Learning (ML) - A proof-of-concept.
- Led a global team of internal & external scientists in planning trails, executing experiments and testing commercial deployment feasibility
- Developed a *Random-Forest* model that improved genetic purity by *25%* in seed batches.

2019 - 2020 **Other Projects** — Solanum/Corn

- ***A Production dashboard:*** that visualizes crucial biotic and abiotic parameters that impacts crop yield so that major crop events like pollination, emasculation can be modified accordingly.
- ***A Plant resistance quantification tool:*** that uses spectral and RGB data to screen plant diseases with *98.6%* accuracy about 1-3 day(s) before visual symptoms arises.
- ***A Plant quality prediction tool:*** that uses 3D imaging for accurate growth predictions developed in collaboration with international teams.

Skills

Technical skills

- **R libraries:** dplyr | tidyverse | rpart | caret/mlr3 | ggplot
- **Python libraries:** Keras | scikit-learn | Pandas/Numpy | Pyspark | OpenCV/PlantCV
- **Tools:** Git | Spotfire | AWS | MATLAB

Soft skills

- **Scientific:** Creative thinking | Logical reasoning | complex problem-solving
- **Professional:** Business acumen | Critical mindset | End-to-end strategy
- **Personal:** Team work | Interpersonal communication | Empathy

Accords and Accreditation

Recognition

- *Selected Speaker* - Imaging and AI driven Decision Science for Cucurbits - 2021.
- *It's You!* Recognition : EMEA Vegetable seeds **PS STAR** for exceptional contribution in 2020.

Certification

- Masterclass on Seed Technology by Wageningen Seed Science Centre - 2022.
- Classifier Design Tool (CDT) for spectral data by Videometer A/S - 2020.
- Image analysis for plant pheno-typing by Wageningen Summer School- 2019.

Past experience

2018-2019 **Research Associate** Uniklink Dusseldorf

- Molecular cloning, gene knockout, point mutation via Overlap PCR.
- Protein expression and purification studies, DNA and RNA sequencing.
- Sex determination, embryogenesis, microscopy and genetic model development in *Drosophila*.

2016-2017 **Graduate Researcher** Goethe University

- Performed 2D stem cell culture in a modified osteogenic medium under BSL-2 aseptic conditions.
- Developed statistical models for gene expression, stem cell proliferation and differentiation.
- Developed *Excel Macros* to aid in automated of molecular biology and gene expression studies.

Education

2014 - 2017 **Master of Science in Biomedical Engineering** Furtwangen University

- Mathematical modelling and error validation in MATLAB.
- Evaluation of signalling pathways like JAK-STAT pathway.
- Modelled the inter-relation between cellular pathways of adherent tissue culture cells.

2010 - 2014 **Bachelor of Technology in Biotechnology** Anna University, India

- Performed microbial and plant tissue culture under BSL-2 aseptic conditions.
- Transformed plasmids using Electroporation for genetic engineering.
- Extracted and analytically purified keratin from poultry waste by chromatography and ultrafiltration.

Other Details

Training and hobbies

- **Virtual Courses:** SQL | PowerApps | Six-sigma
- **Hobbies:** Weekend traveling | Triathlon Training | Kaggle competition