GOKUL KOTTILAPURATH SURENDRAN

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OBJECTIVE

To excel in Artificial Intelligence by working with complete dedication and acquiring new skills. Highly interested in interdisciplinary research to provide solutions for unsolved problems.

EDUCATION

2022-2026 **Doctor of Philosophy in Applied Geoinformatics and Remote Sensing in Forestry** (Pursuing)
(Classical Machine learning and Deep learning)
Faculty of Forestry and Wood Sciences, Czech University of Life Sciences, Prague,

2019-2021 **Master of Philosophy in Computer Science** First-class 89%
(E-Learning Analytics & Nature-Inspired Computing)
Department of Computer Science, Central University of Tamil Nadu, India

2016-2018 **Master of Science in Computer Science** First-class 74%
(Artificial Intelligence)
Department of Computer Science, Central University of Kerala, India

2013-2016 **Bachelor of Science in Computer Science** First-class 69%
(Computer Science, Electronics, Mathematics)
University of Calicut, India

2011-2013 **Higher Secondary / Plus two (Computer Science)** First-class 67%
Vivekodhayam Boy's H S S, Thrissur, Government of Kerala, India

COURSES

2011-2012 **Advanced Diploma in Graphic Designing** B Grade
Adobe & Government of Kerala, India

VOLUNTEER EXPERIENCE & LEADERSHIP

3DForEcoTech (Cost): Working group member (2022-Present).

Kamos (FLD, CZU): Leader of New Ph.D. Students in Faculty of Forestry and Wood Sciences, CZU (2023- 2024 Aug.).

Volunteer: Blue Cross of India (2019-2022).

Alumni Executive Member: Department of Computer Science, Central University of Kerala (2020-Present).

President: Association of Students in Computational Intelligence (ASCI) (2018), Department of Computer Science, Central University of Kerala.

Executive Member: Association of Students in Computational Intelligence (ASCI) (2017), Department of Computer Science, Central University of Kerala.

HONORS

INSPIRE AWARD (2010), DEPARTMENT OF SCIENCE AND TECHNOLOGY, GOVERNMENT OF INDIA.

GRANTS

- **ITC Conference Grant:**

  Awarded by the COST Action 3DForEcoTech to present the poster "Enhancing Bark Classification with Boosted Support Vector Machines Using Bagging and Feature Selection Technique" at the Silvilaser 2023 Conference, London, UK.

ACHIEVEMENTS & AWARDS

2023 - ITC CONFERENCE GRANT,3DForEcoTech; FOR SILVILASER ABSTRACT.

2012 - A GRADE IN SUB-DISTRICT LEVEL SCIENCE EXHIBITION, KERALA.

2011 - A GRADE IN STATE-LEVEL INSPIRE EXHIBITION, GOVERNMENT OF INDIA.

2011 - A GRADE IN DISTRICT LEVEL INSPIRE EXHIBITION, GOVERNMENT OF INDIA.

2010 - INSPIRE AWARD, DEPARTMENT OF SCIENCE AND TECHNOLOGY, GOVERNMENT OF INDIA.

2010 - SCHOOL TOPPER, VIVEKODHAYAM BOY'S H S S, THRISSUR.

2010 - BEST STUDENT, VIVEKODHAYAM BOY'S H S S, THRISSUR.

2008–10 - CLASS TOPPER DURING VIII, IX & X, VIVEKODHAYAM BOY'S H S S, THRISSUR.

CERTIFICATIONS

University of Helsinki, Finland	Elements of AI
IBM	Build Your Own Chatbot
Google	Google Analytics Individual Qualification
	Fundamentals of Digital Marketing
Coursera	Managing Data Analysis
LinkedIn	Artificial Intelligence Foundations: Machine Learning
	Artificial Intelligence Foundations: Neural Networks
	Learning Hadoop
	Hadoop: Data Analysis
	Programming Foundations: Fuzzy Logic
	Security Testing Essential Training
Udemy	Python for Data Science
	Diploma in Basic Game Development
	Artificial Intelligence and Predictive Analysis using Python
	Machine learning & Python & Data Science
Alison	Data Analytics- Introduction to Machine Learning

ETHICAL HACKING & VOLUNTEERING EXPERIENCE

Central University Website (January 2020)

Performed Vulnerability Assessment on one of the Indian Central University websites; reported and guided the authorities to ensure the security essentials.

Voluntarily helped Kerala Police (April 2020)

Helped Kerala Police to catch a cyber-criminal who was torturing many girls on the Instagram platform.

PRESENTED & UNDER REVIEW

- **Ecological Informatics (Journal Paper):** A Forestry Investigation: Exploring Factors Behind Improved Tree Species Classification Using Bark Images, https://doi.org/10.1016/j.ecoinf.2024.102932 .
- **Ecological Informatics (Under review):** Forestry Investigation Phase 2: Enhancing Bark Classification with Boosted Support Vector Machines Using Bagging and Feature Selection Techniques, https://doi.org/10.2139/ssrn.5058953
- **Poster (International):** Enhancing Bark Classification with Boosted Support Vector Machines Using Bagging and Feature Selection Techniques, Silvilaser London, September 6-8 UCL London. https://doi.org/10.5281/zenodo.10446837
- **Conference Paper (International):** Machine learning technique for close range tree species classification" on UNECE/FAO (Food and Agriculture Organization of the United Nations) Team of Specialists on Forest Communication- Forest Communicators' Network annual meeting and workshop. Prague 20-22 June 2023. https://doi.org/10.5281/zenodo.10458204
- **Pre-print:** "A Comparative Analysis of Machine Learning Algorithms for Tree Species Recognition Using An Image-Based Approach with Implementation Potential for Close-range Technologies", EGU General Assembly 2023, Vienna, Austria. https://meetingorganizer.copernicus.org/EGU23/EGU23-14332.html
- **Poster (International):** "TREE SPECIES CLASSIFICATION FROM RGB IMAGES BASED ON TREE BARK IMPLEMENTED INTO TERRESTRIAL PHOTOGRAMMETRY PROCESS," 3DForEcoTech CONFERENCE, PRAGUE. https://doi.org/10.5281/zenodo.10447108
- **Conference Paper (International):** "NATURAL INSPIRED RECOMMENDER SYSTEM BASED ON STUDENT PERFORMANCE," INTERNATIONAL E-CONFERENCE ON 'INNOVATIONS IN INFORMATION TECHNOLOGY', BHARATHIYAR UNIVERSITY, TAMIL NADU, 2020. ISBN: 978-93-89105-53-7.
- **Conference Paper (International):** "COVID-19, KERALA ANALYSIS AND PREDICTION FROM THE EARLIER PHASE OF THE PANDEMIC", INTERNATIONAL CONFERENCE ON 'DATA SCIENCE AND INFORMATION ECOSYSTEM'21', MADURAI KAMARAJ UNIVERSITY, TAMIL NADU, 2021. ISBN: 978-93-91373-04-7.
- **Journal Paper:** "NATURE-INSPIRED LEARNING PATH RECOMMENDATION SYSTEM FOR STUDENTS IN E-LEARNING PLATFORMS", JOURNAL OF ENGINEERING EDUCATION TRANSFORMATIONS, VOL. 37, ISSUE:3, PAGES: 185-195.

  https://doi.org/10.16920/jeet/2024/v37i3/24014

PARTICIPATED

- Participated and Presented the topic "Machine learning technique for close range tree species classification" on UNECE/FAO (Food and Agriculture Organization of the United Nations) Team of Specialists on Forest Communication- Forest Communicators' Network annual meeting and workshop. Prague 20-22 June 2023.
- 23rd ANNUAL NEW YORK STATE CYBER SECURITY CONFERENCE, NEW YORK, 2021.
- FDP ON COMPUTER SCIENCE & BIOLOGY, AICTE & MANGALORE UNIVERSITY.
- NATIONAL WORKSHOP ON ARTIFICIAL INTELLIGENCE, AICTE & CENTRAL UNIVERSITY OF KERALA.
- NATIONAL WORKSHOP ON PATTERN RECOGNITION, CENTRAL UNIVERSITY OF KERALA.
- TECHNOFRENZY 2k16, INTELLI-OUTREACH PROGRAM, ASCI.

ORGANIZED

- "**One-Day Workshop on Machine Learning and ML Tools in Forestry**" : Organized on 26th March 2024 by Kamos FLD in collaboration with the Faculty of Forestry and Wood Science, Czech University of Life Sciences, Prague, Czech Republic.
- **"Swarm Intelligence for Robotics" (Webinar) :** Conducted on 16th August 2024 by Kamos FLD in collaboration with the Faculty of Forestry and Wood Science, Czech University of Life Sciences, Prague, Czech Republic.

RESEARCHES UNDERGOING

- Benchmarking of Machine learning and Deep learning algorithms for Tree species classification.
- Application of Machine learning methods for tree species classification using three-dimensional data from close-range photogrammetry and iphone laser scanning.

EUROPEAN UNION PROJECTS

- **Technician (Working group 4) at REFOREST**: Reforest is a Horizon Europe-funded project aimed at fostering innovation, supporting knowledge exchange, and providing novel solutions to empower farmers in Europe and associated countries to deliver multiple objectives: food production, carbon capture, and biodiversity. https://agroreforest.eu/
- **Researcher (Working group 1,2,3,4) at 3DForEcoTech (COST ACTION CA20118):** 3DForEcoTech Project aims to establish a strong network of scientists and stakeholders and sensor manufacturers to synchronize the knowledge, to develop general protocols and algorithms for forest ecosystem state survey and forest functioning, and to make these novel technologies available to a broad audience. https://3dforecotech.eu/

PERSONAL PROJECTS

Application of Machine learning methods for tree species classification

Czech University of Life Sciences (CZU), Prague, Czech Republic

09/2022 – 12/2023

Internal Grant Agency of CZU, Prague, funds the project. This research project aims to develop a new system architecture for the application of machine learning and deep learning algorithms in forestry. The primary focus is to provide a dataset of Bark images (Bark net for Europe) and explore the application and possibilities of different ML algorithms on the same. Approved budget : 11961 Euros

E-learning Analytics & Nature-Inspired Computing

CENTRAL UNIVERSITY OF TAMIL NADU

09/2019 – 2021

The research focuses on developing a new method to improve the quality and productivity of students in E-learning platforms. As part of the research, implemented a method titled "NATURAL INSPIRED RECOMMENDER SYSTEM BASED ON STUDENT PERFORMANCE".

Tumor Detection and Classification using Support Vector Machine

CENTRAL UNIVERSITY OF KERALA

11/2017 – 03/2018

The project aimed to detect and extract different types of tumors from patients' MRI scan images. The system initially classifies the tumours and benign; the procedure only considers the tumour images in the second phase. Here, the system locates the tumour based on its position and tags the tumours according to their specific names.

Deformable Mesh Model for Cardiac Motion Estimation from MRI Data

CENTRAL UNIVERSITY OF KERALA

06/2017 – 11/2017

The project estimates the left ventricular motion through a whole cardiac cycle based on the Image-Matching non-rigid Deformable Mesh. The system also predicts the patient's heart problems.

INTERNSHIPS

UNIVERSITY COLLEGE LONDON (UCL) (NOVEMBER-DECEMBER, 2023)

Supervisor: Martin Mokros

Generating tree species dataset BarkNet Europe 1.0: This internship aimed to contribute to the world's largest dataset of tree species for machine learning and deep learning.

NATIONAL FOREST CENTRE-FOREST RESEARCH INSTITUTE, ZVOLEN, SLOVAK REPUBLIC (MAY-AUGUST 2023)

Supervisors: Tomas Bucha and Tomas Gergel

Tree species Health detection and Identification using CT Scanner: The research aimed to identify the tree species and classify them based on the quality grade level of the wood using machine learning and deep learning algorithms.

SUMMERSCHOOLS

- **AI Technologies for Processing Multi-source Earth Observation (EO) Data** Participated in the summer school held from 10th to 12th June 2024, organized by the Luxembourg Institute of Science and Technology (LIST), Luxembourg.
- **Interdisciplinary Summer School on Forest Ecosystems 2024** Participated in the summer school held from 26th to 30th August 2024 in Warsaw, Poland. Organized by 3DForEcoTech COST Action and PROCLIAS COST Action, with local organization by the Forest Research Institute.

RESEARCH SOFTWARE DEVELOPED

Windows Applications (.exe):

Standard Machine learning Classifier

Gokul K S & Martin Mokros

The software has been designed to facilitate machine learning classification (image data) by incorporating various algorithms (AdaBoost, Decision Trees, Gradient Boosting, Naïve Bayes, Random Forest, and Support Vector Machine), including the Gray-level Co-occurrence Matrix (GLCM) for Feature Extraction. Users are empowered to customize the Train-Test Split to suit their needs. Additionally, the software offers Detailed Classification Reports, Confusion Matrix Visualization, and a range of other standard features commonly found in similar software solutions.

Advanced Machine learning Classifier

Gokul K S & Martin Mokros

This software is an advanced tool for machine learning classification. It utilizes Convolutional Neural Networks for feature extraction and offers multiple algorithm options, including AdaBoost, Decision Trees, Gradient Boosting, Naïve Bayes, Random Forest, and Support Vector Machine. It also includes Boosted Algorithms with Bagging, customizable Train-Test Split, CNN feature extractor, and advanced features such as identifying misclassified images, predicting outcomes for new sets of images, and visualizing results with interactive confusion matrices and detailed classification reports. Link : https://zenodo.org/records/14841241

CNN Parameter Tuner

Gokul K S & Martin Mokros

This application streamlines parameter tuning in Convolutional Neural Networks (CNNs). It facilitates loading and analyzing images in various formats (jpg, jpeg, png), offers customizable CNN model, Train-Test Split, and provides tuning options, including defining the number of epochs, setting batch size, choosing activation for the final dense layer, selecting optimizer function, and picking a suitable loss function. Users can visualize results with interactive confusion matrices, explore results through interactive graphs, and access detailed classification reports for comprehensive insights. Link: https://zenodo.org/records/14840647

Image Augmentor

Gokul K S & Martin Mokros

This application efficiently generates numerous images from a single set using diverse augmentation techniques. Users can adjust various parameters such as rotation range (0-180), width and height shift ranges (0.00 - 1.00), shear range (0.00 - 1.00), zoom range (0.00 - 1.00), flip options (horizontal, vertical), and fill mode (nearest) to customize the augmentation process according to their preferences. Link: https://zenodo.org/records/10846056

Web Applications:

Soil Carbon Estimator

Gokul K S & Martin Mokros

This application calculates soil organic carbon based on inputs of longitude and latitude. I developed the front end of this Python-based web application, hosted it, and currently manage the server.

Link: https://soilcarbonestimator.fld.czu.cz/

Biodiversity Estimator

Gokul K S & Martin Mokros

This application calculates biodiversity (number of plant species) based on inputs of longitude and latitude. I developed the front end of this Python-based web application, hosted it, and currently manage the server.

Link: https://biodiversityestimator.fld.czu.cz/

Android Application (.apk):

Bark Classifier 1.0

Gokul K S & Martin Mokros

This Android application facilitates tree species classification. Users can capture bark images of trees and receive corresponding class labels upon prediction. Initially, it supports classification for four tree species.

R- Package: FORTLS (2024)

Involved in FORTLS Package to develop new machine learning approaches for tree species classification. CRAN - Package FORTLS (r-project.org)

DATASETS

- **Slovak Exact Cropped Extended Dataset**

  Contains 1367 images of four tree species (European beech, Sessile oak, Norway spruce, and European silver fir) captured in Slovakia, June 2022. Images were taken from ~0.5m, ensuring a 60% overlap between consecutive images. Link: https://zenodo.org/records/14800379

- **Slovak Normal Cropped Dataset**

  Consists of 1369 images (same species as the exact cropped dataset) captured in Slovakia, June 2022, with anomaly regions removed and the rest of the image retained. Link: https://zenodo.org/records/14228004

- **Nonlinear Dataset**

  Derived from 321 images of the Slovak exact cropped dataset to evaluate machine learning algorithms. Includes four tree species with nonlinear patterns, captured in Slovakia, June 2022. Link: https://zenodo.org/records/14221584

- **CZU Exact Cropped Dataset**

  Contains 386 images of four species captured at CZU, Prague, August 2022. Focuses on bark structure and patterns with multiple angles per tree. Link: https://zenodo.org/records/14221740

- **CZU Normal Cropped Dataset**

  Includes 386 images of four species captured at CZU, Prague, August 2022, with anomaly regions removed, focusing on bark patterns from multiple angles. Link: https://zenodo.org/records/14221890

- **CZU Combination Dataset**

  Combines 772 exact cropped and 386 normal cropped images captured at CZU, Prague, in August 2022. Focuses on four tree species (European beech, large-leaved linden, Norway maple, and Scots pine) with multiple angles and at least ten images per tree. Link: https://zenodo.org/records/14228080

SKILLS & COMPETENCIES

Research | Leadership | Artificial Intelligence | Digital Image Processing | Data Analysis | Machine Learning | Nature-Inspired Computing | Digital Speech Processing | Photogrammetry

SOFTWARE

MatLab | Weka | Apache Mahout | Android Studio | Adobe Master Collection | Microsoft Office | Latex

PROGRAMING LANGUAGE

C | C++ | Python | Java | PHP | .Net

LANGUAGES

English	- Fluent
Malayalam	- Native
Hindi	- Basic skills
Tamil	- Basic skills

REFERENCE

Dr. Martin Mokros – m.mokros@ucl.ac.uk Lecturer, Department of Geography, University College London.

Dr. P. Thiyagarajan- thiyaguphd@gmail.com Associate Professor, Department of Computer Science – Central University of Tamil Nadu, Tamil Nadu, India.

Dr. Thasleema T M – thasnitm1@hotmail.com Assistant Professor, Department of Computer Science – Central University of Kerala, India.

Dr. R. Rajesh – kollamrajeshr@gmail.com Professor, Department of Computer Science – Central University of Kerala, India.

31/03/2025