Arijit Nandi

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Summary

Passionate AI/ML Engineer and Researcher with 5+ years of experience turning cutting-edge concepts into impactful solutions. Skilled in federated learning, data streaming, deep learning, and emotion recognition, with hands-on expertise in Python, TensorFlow, and PyTorch. Currently pushing boundaries in explainable AI (XAI) to make AI systems smarter and more transparent. Passionate about solving complex problems and building innovative, impactful AI solutions. Ready to contribute to exciting projects in a collaborative environment.

Skills

Programming Languages: Python, MATLAB

MLOps: Docker, Streamlit, MLFlow, Airflow

ML/DL Stack: Keras, Numpy, Pandas, Scikit-Learn, Tensorflow, OpenCV, OpenFL, TensorFlow Federated

Data streaming: Scikit-multiflow, River, Kafka, RabbitMQ, MQTT

Explainable AI: SHAP, Innvestigate

Version control: Git

Experience

Eurecat - Technology Center of Catalonia   Barcelona, Spain
AI Researcher, Big Data and Data Science Unit   *Dec 2022 – Now, Full-time*
- Worked on the "AI4Drought" project in a collaborative effort with the European Space Agency (ESA), Lobelia Earth, and Barcelona Super Computer (BSC) to improve seasonal climate predictions of drought through the broad understanding of Earth Observation data and climate variables. The main contribution was on the explainable AI (XAI) methods for explaining the drought prediction AI models and pointing out the most influencing indicators for drought prediction.
- Developed an explainable AI GUI app (XaiSS) that combines different XAI open-source libraries and make a unified drag-and-drop platform where all different XAI approaches are readily available to use for the developed AI models (either in Scikit-learn, TensorFlow, or Pytorch). This app is deployed using Python 3.10, Streamlit, and Docker-container.

Eurecat - Technology Center of Catalonia   Barcelona, Spain
AI Researcher, Training Unit   *Dec 2019 – Dec 2022, Full-time*
- Contributed as an AI expert to design and develop AI MOOC course for young people – AIM4YOU under the EU project *YNSPEED – Youth new personal & employable skills development*, URL: https://irea.teachable.com/p/artificial-intelligence
- Worked on developing an initial version of a collaborative and content-based filtering recommendation system to recommend courses to students for the Moodle LMS.

Tuttify.io   Wesley Chapel, FL, United States, Florida
Freelance AI Engineer   *Mar 24, 2022 – May 23, 2023*
- Contributed as an AI expert to design and develop emotion recognition from facial expression using Tensorflow 2.0 and FER 2013, CK++. The trained model is deployed in the backend of Tuttify (https://tuttify.io/) to recognize different emotions of the students.
- Another key contribution is the pose estimation of students taking courses on Tuttify combined with the emotional status throughout the course to find their attention span and engagement.

Projects

Docker based Federated Learning (DFL) | *GitHub*
- Developed Docker-enabled Federated Learning (DFL) by utilizing client-agnostic technologies like Docker containers to simplify the deployment of FL frameworks for data stream processing on the heterogeneous client in the HPC systems. In the DFL, the clients and global servers are written using TensorFlow and lightweight message queuing telemetry transport protocol to communicate between clients and global servers in the IoT environment. The DFL is deployed inside Eurecat's HPC– DATURA.

Federated Learning Method for Real-time Emotion State Classification (Fed-ReMECS) | *GitHub*

- Developed a federated learning framework for real-time emotion state classification using multi-modal physiological data streams from wearable sensors called Fed-ReMECS. The main aim was emotional state detection under demanding requirements of decentralized data and protecting users' privacy of sensitive information. The Fed-ReMECS was developed using Python 3.6, TensorFlow 2.0, Keras, and MQTT.

Dynamic Weighted Federated Learning for Android Malware Classification (DW-FedAvg) | *GitHub*
- To mitigate the conventional FedAvg's issue, the dynamic weighted federated averaging (DW-FedAvg) strategy was designed, where a dynamic weight adjustment for each local model is automatically updated based on their performance at the client. The DW-FedAvg was developed using Python 3.6, TensorFlow 2.0.

Tuttify's Human Pose Estimation as A Service (CaamPose)
- Developed and customized the pose estimation of students using Openpose models in real-time for the Tuttify application. The trained model is deployed in the backend of Tuttify (https://tuttify.io/) to recognize different poses of the students. The CaamPose was developed using Python 3.6, TensorFlow 2.0.

Tuttify's Face Emotion Recognition as A Service (CaamFace)
- Designed and developed emotion recognition from facial expression using Tensorflow 2.0 and FER 2013, CK++. The trained model is deployed in the backend of Tuttify (https://tuttify.io/) to recognize different emotions of the students. The CaamFace was developed using Python 3.6, TensorFlow 2.0.

EDUCATION

Universitat Politècnica de Catalunya (UPC) — Barcelona, Spain
Ph.D. in Artificial Intelligence — *Dec 2019 – Sept 2024*

Thesis: Multimodal data stream classification and prediction of e-Learner's emotional states
- ∗ Designed and developed real-time emotion classification from physiological data (EEG, ECG, GSR, etc.) streams in the E-Learning context.
- ∗ Developed privacy-preserved distributed machine learning/deep learning systems, a.k.a Federated Learning for real-time emotion classification from IoT devices.

National Institute of Technology Durgapur (NIT) — West Bengal, India
M.Tech in Computer Science and Engineering — *Aug 2017 – Mar 2019*

Thesis: A study of Enhanced Particle Swarm Optimization Trained Neural Network for Classification
- ∗ Artificial Neural Network training for different classification scenarios using derivative-free optimization techniques (such as Particle Swarm Optimization) to mitigate the local minima stuck problem.
- ∗ Developed parameter tuning of derivative-free optimization techniques (such as Differential Evolution) using Reinforcement Learning (Q-learning approach) for Artificial Neural Network training in different classification scenarios.

SELECTED PUBLICATIONS

- **Arijit, Nandi**, Fatos Xhafa, and Rohit Kumar. A docker-based federated learning framework design and deployment for multi-modal data stream classification. Computing, pages 1–35. Springer, 2023
- **Arijit Nandi** and Fatos Xhafa. A federated learning method for real-time emotion state classification from multi-modal streaming. Methods, volume 204, pages 340–347, 2022
- **Arijit Nandi**, Fatos Xhafa, Laia Subirats, and Santi Fort. Reward-penalty weighted ensemble for emotion state classification from multi-modal data streams. International Journal of Neural Systems, 2022
- Ayushi Chaudhuri, **Arijit Nandi**, and Buddhadeb Pradhan. A dynamic weighted federated learning for android malware classification. In Soft Computing: Theories and Applications: Proceedings of SoCTA 2022, pages 147–159. Springer, 2023

AWARDS & ACHIEVEMENTS

Vicente López of **Eurecat** (Centro Tecnológico de Cataluña (member of Tecnio)), Barcelona, Spain, as a Ph.D. research scholar in Universitat Politècnica De Catalunya (Barcelona Tech)-UPC (Dec. 2019– Dec 2022). The research was partially funded by ACCIO under the project TutorIA.

M.Tech. Fellowship Awarded to the students for their master's study from the Ministry of Human Resource and Development (MHRD) India (August 2017– August 2019).

REFERENCES

Dr. Rohit Kumar, Senior Information Architect at AstraZeneca, Barcelona, Spain.