Yug D Oswal

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EDUCATION

VIT Vellore <div align="right">Vellore, Tamil Nadu, India</div>

*Bachelor of Technology in Computer Science and Engineering, **CGPA: 9.51/10*** <div align="right">*Sep. 2022 - Jun. 2026*</div>

RESEARCH

Computationally Efficient Quadratic Neural Networks

*Mathew Mithra Noel, Venkataraman MN, **Yug D Oswal*** <div align="right">*arXiv, 2023-2025*</div>
- Resolved the computational bottleneck in higher order ANNs, enabling expressive yet efficient models.
- Designed $O(n^2)$ complexity reduced parameter RP-QNNs and vectorized forward/backward matrix algorithms.

Cone-Class of Activations: More Learning, Less Neurons

*Mathew Mithra Noel, **Yug D Oswal*** <div align="right">*arXiv, 2025*</div>
- Introduced hyperstrip representations enabling exponentially smaller yet performant foundation models.
- Achieved $\geq 4.6\%$ Top-1 accuracy increase on ImageNet while reducing parameters by 46.4% in VGG19.

Loss Switching, Novel Classification and Regression Losses

Mathew Mithra Noel, Arindam Banerjee, **Yug D Oswal***, Geraldine Bessie, Venkataraman MN* <div align="right">*arXiv, 2024*</div>
- Proposed novel loss functions and scheduling strategies accelerating convergence and final model performance.
- Presented regression losses robust to noise and distribution shifts, improving RMSE by $\geq 1.4\%$ in 4 benchmarks.

EXPERIENCE

SPAR Fellow <div align="right">Sep. 2025 – Present</div>

Harvard, with Shivam Raval <div align="right">*USA, Remote*</div>
- Researching mechanistic interpretability and CoT monitorability by developing control knobs to regulate CoT–output correspondence.

Research Intern <div align="right">Apr. 2025 – Present</div>

William & Mary, with Dr. Jindong Wang (formerly Microsoft Research Asia) <div align="right">*USA, Remote*</div>
- Developing statistical interventions for generalizable alignment of CoT in LLMs, achieving 25-35% accuracy increase and mitigated bias on the BBQ religion subset.

AI/ML Engineer <div align="right">Jul. 2024 – Oct. 2024</div>

Bharat Dynamics Limited - Ministry of Defence, India <div align="right">*Hyderabad, India*</div>
- Procured and curated a dataset for UAV detection using MATLAB scripts and the Computer Vision Toolbox.
- Researched and hypertuned SOTA object detection models, techniques, and training strategies to build a robust UAV Detection and Tracking service, tested in 4 environments, for field scenarios.
- Engineered unique edge and web migratable model deployments on isolated systems following defence policies.

Machine Learning Engineer <div align="right">Feb. 2024 – Jul. 2024</div>

WebTiga (renamed Synergetics.AI) - a MIT Startup <div align="right">*Bangalore, India*</div>
- Developed classical ML POCs for clients in the insurance domain and an audio-based car damage classifier.
- Led the ML lifecycle and engineered full-stack pipelines - agentic workflows, guardrails, history-aware chat, and RAG - in real-time deployment of a humanoid speech agent for de-addiction therapy, reducing latency by 53%.

Project Lead <div align="right">Jun. 2023 – Aug. 2023</div>

University of Auckland & Signal Corporation Limited <div align="right">*Auckland & Wellington, New Zealand*</div>
- Led an international team to resolve 5 real-world issues and enhance Signal's real-time threat prediction system.
- Developed a pipeline involving incremental clustering, Named Entity Recognition (NLP), and geocoding.

SELECTED PROJECTS

Rekindle | *Tensorflow (keras), pandas, Python, FastAPI, PostgreSQL, Ngrok, Git* <div align="right">May 2023 – May 2023</div>
- A service to aid Alzheimer's and Dementia disease patients. Featured in Intel's Developer Spotlight.
- Trained custom encoder-decoder NLP models with novel loss functions and distributed strategies, outperforming baselines on the Google GoEmotions benchmark, and securing 2nd place in the Intel (BOLT) Hackathon.

TECHNICAL SKILLS

Technical: C, C++, Python, SQL, Git, Tensorflow, PyTorch, Keras, Java, JavaScript, Node.js (Express), Flutter (Dart), Firebase, MongoDB, Redis, Docker, Scikit-learn, Numpy, Pandas, Seaborn, Matplotlib, Statsmodels, R
Certifications: Machine Learning Specialization, Deep Learning Specialization, DeepLearning.AI Tensorflow Developer Professional Certificate, EDA and Data Visualization (Scaler), Advanced Techniques in Tensorflow