

Deepak Dalakoti

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CAREER PROFILE

- Senior data scientist with over 5 years of experience working with big data and machine learning, bridging industry and academic landscapes
- Comprehensive proficiency in a diverse range of machine learning techniques encompassing Classification, Regression, Natural Language Processing, Computer Vision, and recent advancements in Generative AI
- PhD in computational engineering from UNSW with outstanding thesis award
- Excellent communication, presentation and stakeholder management skills

SKILLS

Computer languages	Python, C/C++, HTML, CSS, Javascript
Python libraries	Hugging Face, Spacy, Pytorch, LangChain, Scikit-learn, XGBoost, Scipy
Other skills	Docker, SQL, Git, L ^A T _E X, Linux

RELEVANT WORK EXPERIENCE

Senior Data Scientist 05/2023 - Present
TAL Life Insurance, Sydney

- Supporting insurance underwriting by developing insights and AI models to enhance human decision-making around underwriting decisions using historical claims and underwriting data

Senior Data Scientist 10/2022 - 05/2023
QBE Insurance, Sydney

- Led data science projects aiding in the management of AUD 1 billion portfolio of long-tail claims using machine learning techniques. Led conversations with stakeholders and was responsible for inception, planning, management and delivery of projects
- Built a model to identify claims which would need specialist claims officer intervention by predicting the complexity of a claim with a precision of 95%, enabling early intervention by specialists
- Built a recommendation model to extract claims most similar to a given claim to help in the management of claims by referring to past decisions

Data Scientist 08/2021 - 10/2022
QBE Insurance, Sydney

- Improved machine learning models used for identifying missed reinsurance opportunities, leading to a lift in precision from 50% to 80% and saving business AUD 8 million in FY21
- Developed pipeline to extract and store the text from thousands of claim-relevant emails, PDFs and Word documents.
- Trained transformer-based named entity recognition model on claim documents to extract relevant keywords from large documents with a precision of 85%
- Developed web apps to present analytics to stakeholders using Python web frameworks like FastAPI/SQLModel

Postdoctoral Research Fellow 2019 - 08/2021
University of New South Wales, Sydney

- Introduced and educated the team in the use of machine learning techniques in numerical simulations of turbulent flows and combustion

- Integrated models like deep neural networks, gradient-boosted regression trees, Bayesian networks and genetic programming models into numerical simulations of combustion to improve simulation accuracy
- Published studies involving the use of machine learning in combustion applications in leading journals

EDUCATION

PhD, Engineering/Computational Mathematics

2015 - 2019

University of New South Wales, Sydney

Thesis title: Direct numerical simulations of lifted flames in diesel engine conditions

- Developed software in C++/Fortran to perform high fidelity numerical simulations of combustion in advanced diesel engine conditions using high performance computing which generated ≈ 100 TB data
- Wrote optimised, scalable code in C++, Python and Fortran to analyse the simulation database
- Contributed to the fundamental understanding of combustion physics which would enable the design of cleaner and more efficient engines which resulted in publications in leading journals and conference proceedings

B. Tech, Mechanical Engineering

2011 - 2015

Indian Institute of Technology (IIT) Kanpur, India

GPA: 9.5/10

- Academic excellence award

RELEVANT PROJECTS

Fine-tuned large language models on WhatsApp chat for personalised chatbot

<https://github.com/deepakdalakoti/llm-play>

- Fine-tuned a quantized open-source large language model (LLM) using Hugging Face API on WhatsApp chat data to mimic conversations with friends
- Used LangChain to create a chat agent based on the fine-tuned model

Super-Resolution Generative Adversarial Neural Network for turbulence modeling

https://github.com/deepakdalakoti/Generative_adversarial_network

- Used a generative adversarial neural network (GAN) to upscale the small scales of turbulence in low-resolution data obtained from low fidelity simulations
- Trained the model on a large dataset (≈ 100 GB) using GPUs. This model outperformed the conventional models available in literature in terms of flow prediction accuracy

Principal component analysis and artificial neural network based combustion model

<https://github.com/deepakdalakoti/PCA-ANN>

- Used a principal component analysis and neural network based combustion model to predict chemical reaction rates in a turbulent flame
- Trained the neural network using a novel cost function to account for mass conservation. The model showed improved performance in terms of both speed and accuracy over the models typically used in the literature

RELEVANT PUBLICATIONS

1. **D. Dalakoti**, A. Wehrfritz, B. Savard, M. S. Day, J. B. Bell, and E. R. Hawkes. An a priori evaluation of a principal component and artificial neural network based combustion model in diesel engine conditions. *Proceedings of the Combustion Institute*, 38(2):2701–2709, 2021.

AWARDS AND SCHOLARSHIPS

Dean's Award for Outstanding PhD Theses <i>University of New South Wales, Sydney</i>	<i>2019</i>
University International Postgraduate Award (UIPA) <i>University of New South Wales, Sydney</i>	<i>2015</i>
Academic Excellence Award for Undergraduate Studies <i>Indian Institute of Technology Kanpur, India</i>	<i>2011-2015</i>
Summer Undergraduate Research Grant for Excellence <i>Indian Institute of Technology Kanpur, India</i>	<i>2013</i>

RELEVANT COURSES

University	MOOC
Computational mathematics	Machine learning
Probability and stochastic processes	Applied machine learning in Python
	Bayesian statistics
	Inferential statistics
	Advanced Presentations

INTERESTS/HOBBIES

Interests	Formula 1, Cricket, Music
Hobbies	Badminton, Running, Table Tennis, Reading, Travelling