

Thabang L. Mashinini-Sekgoto

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Summary

Applied machine learning scientist and systems engineer with 10+ years of experience building production-grade AI platforms at scale. I design and operationalise end-to-end ML systems spanning data pipelines, distributed learning, and governance that survive real-world constraints and I've led mission-critical AI transformations across telecoms, banking, education, and research, translating advanced ML into measurable enterprise impact.

Education

University of the Witwatersrand

Johannesburg, South Africa

PHD IN COMPUTER SCIENCE (IN PROGRESS)

2024 – Present

- Research focus on advancing **self-supervised learning**, **probabilistic modelling**, **computer vision** and **distributed ML systems** to reduce dependency on labelled datasets and enable scalable AI adoption in real-world, low-resource environments.
- Application domains include **environmental risk modelling**, **sensor fusion**, and **real-time decisioning systems**.

University of the Witwatersrand

Johannesburg, South Africa

MSC IN COMPUTER SCIENCE (DISTINCTION)

2018 – 2019

- 📄 **Thesis: Learning Level Set Method by Echo State Network for Image Segmentation**
- Developed a novel recurrent neural network approach using **Echo State Networks (ESNs)** for iterative image segmentation, enabling computationally efficient training and improved boundary detection.
- Research demonstrated potential applications in **medical imaging**, **remote sensing**, and **autonomous navigation** through enhanced segmentation performance.

University of the Witwatersrand

Johannesburg, South Africa

BSC HONOURS IN COMPUTER SCIENCE

2017

- **Project: Wildfire Estimation Using Kernel Density Estimators**
- Applied Spatial KDE and unsupervised learning techniques to model wildfire occurrence patterns across South Africa, contributing insights for **disaster management** and **early-warning systems**.

University of the Witwatersrand

Johannesburg, South Africa

BSC IN COMPUTATIONAL & APPLIED MATHEMATICS AND ASTRONOMY & ASTROPHYSICS

2014 – 2016

- Completed dual majors with emphasis on **mathematical modelling**, **numerical methods**, and **astrophysical simulation**, forming the foundation for later work in machine learning and probabilistic systems.

Experience

ABSA Insurance

Johannesburg, South Africa

LEAD DATA SCIENTIST (ACTING HEAD OF DATA SCIENCE)

Mar. 2024 – Present


- Mandated to establish and scale **enterprise-grade data science and engineering capabilities** within ABSA Insurance, defining strategy, operating models, and delivery standards.
- Built and led the **Data Science and Engineering function** from the ground up, managing a team of **3 Data Scientists** and **1 Data Engineer** to advance data-driven risk mitigation in short-term insurance.
- Partnered with senior leadership to shape **AI strategy, roadmap, and capability scaling**, ensuring alignment between technical execution and long-term business outcomes.
- Architected and operationalised **enterprise ML pipelines on Databricks**, reducing model training and scoring latency by **80–90%** and contributing to a **10% improvement in client retention**.
- Designed and deployed **geospatial flood risk models** for property insurance, improving underwriting accuracy and geographic risk visibility by **80%**.
- Stabilised and modernised the **telematics driving-behaviour scoring ecosystem** used across vehicle finance and insurance products, eliminating multi-month backlogs, improving data quality, and enabling proactive digital engagement.
- Introduced **AI governance, monitoring, and model versioning** practices to strengthen reliability, regulatory compliance, and production ML performance.
- Established enterprise-wide **ETL and ML standards** via the open-source 📄 **Ubunye-AI-Ecosystems (UAIE)** initiative, creating reusable pipelines that accelerated development velocity and supported organisational capability uplift.

Vodacom

Johannesburg, South Africa

SENIOR DATA SCIENTIST (MLOPS, STREAMING AI, AND OPTIMISATION)

Nov. 2021 – Mar. 2024




- Entrusted with designing and operationalising **real-time, ML-driven optimisation systems** to improve network resilience and operational performance across Vodacom's national infrastructure.
- Provided technical leadership across data science, engineering, and IoT teams, mentoring **7 Data Scientists** while defining delivery standards and driving platform adoption.
- Partnered with senior leadership to align AI initiatives with core operational KPIs, embedding data-driven optimisation into Vodacom's national resilience and load-shedding response strategy.
- Architected and owned Vodacom's **real-time ML and optimisation platform** for network operations, integrating streaming analytics, optimisation models, and IoT telemetry to enhance maintenance decisions and improve network reliability during load-shedding.
- Developed the  **Smart Generator Monitoring and Optimisation Engine**, enabling national-scale smart-generator allocation and optimisation contributing to an estimated **~R1 billion in annual OPEX savings** through improved fuel efficiency, maintenance scheduling, and site prioritisation.
- Designed and implemented scalable **MLOps and streaming pipelines** using Apache Flink, PySpark, Kafka, and Kubernetes, reducing model deployment cycles by **40%** and enabling reliable real-time analytics at national scale.
- Recognised with the **Vodacom Star Award** for advancing the organisation's big data, streaming analytics, and AI capabilities.

IBM Research

Johannesburg, South Africa

MACHINE LEARNING RESEARCH SCIENTIST

Apr. 2020 – Nov. 2021


- Recruited to translate cutting-edge machine learning research into **enterprise-ready geospatial and climate intelligence systems** in collaboration with global IBM research and engineering teams.
- Designed and operationalised **large-scale geospatial and meteorological analytics pipelines**, enabling climate risk assessment, environmental intelligence, and disaster resilience use cases for enterprise and public-sector clients.
- Developed **state-of-the-art predictive models** using **TensorFlow**, improving seasonal climate forecast accuracy by **15%** and strengthening decision-making reliability across multiple industries.
- Integrated advanced ML workflows into the  **IBM PAIRS Geospatial Platform**, expanding real-time geospatial data access and supporting strategic planning at global scale.
- Led the design and deployment of the  **COVID-19 Analytics Dashboard** for Gauteng public health authorities, delivering real-time epidemiological insights to support operational response during the pandemic.
- Provided technical and research leadership by co-leading a cohort of **3 PhD and 2 MSc research interns**, ensuring research rigor, production relevance, and collaborative delivery across multiple ML projects.
- Served as technical lead within an international, cross-functional research group, aligning research objectives with platform delivery and coordinating development across regions.
- Co-authored and published peer-reviewed research at  **NeurIPS**, advancing state-of-the-art machine learning methods and strengthening IBM's global research presence.

Business Intelligence Service (University of the Witwatersrand)

Johannesburg, South Africa

DATA SCIENTIST

Jun. 2018 – Apr. 2020




- Joined a central analytics division responsible for integrating institutional data and translating it into decision-support insights for executive leadership and government subsidy planning.
- Designed and operationalised **end-to-end machine learning pipelines** in collaboration with BI analysts and engineers, supporting student success, performance management, and strategic planning initiatives.
- Developed a **course recommendation system** using K-modes clustering, achieving a **90% silhouette score** and generating approximately **R2 million annually** in government subsidy through improved enrolment and pass-rate alignment.  **Git repository**
- Introduced structured feature engineering and model training workflows, improving model reliability and reproducibility across analytics use cases.
- Led and facilitated over **50 workshops** for staff and students, strengthening institutional capability in data science, analytics engineering, and applied machine learning.

Council for Scientific and Industrial Research (CSIR)

Pretoria, South Africa

DATA SCIENTIST AND SOFTWARE ENGINEER

Nov. 2017 – Jan. 2018

- Selected to work within a multidisciplinary team to develop **data-driven decision-support systems** for South African municipalities and public-sector stakeholders.
- Designed and implemented **predictive profiling models** using Python and Scikit-learn, achieving **75% accuracy** and identifying operational bottlenecks that improved service delivery planning.
- Developed and deployed a **Django-based decision-support web application** for municipal managers, enabling real-time data access and operational visibility.
- Recognised for innovation in applied data science and public-sector digital solutions by  **Mail & Guardian**,  **CSIR**, and  **DST**.

ZAR X

Johannesburg, South Africa

SYSTEMS ANALYST AND SUPPORT

Jun. 2017 – Oct. 2017

- Supported and enhanced the reliability of a high-availability financial trading platform, collaborating with IT and engineering teams to resolve critical system issues.
- Implemented performance improvements and workflow refinements that reduced platform downtime by **20%**.
- Improved reporting accuracy and operational visibility by strengthening data integrations across trading and analytics systems.

Wits Astronomy Club (WAC)

Johannesburg, South Africa

Co-FOUNDER AND EXECUTIVE

Jan. 2014 – Feb. 2017

- Co-founded the [Wits Astronomy Club](#) as a science outreach and public engagement initiative aligned with the **Square Kilometre Array (SKA)** vision.
- Designed and led public lectures, stargazing events, and workshops that connected students, researchers, and industry partners, strengthening astronomy awareness and STEM engagement.
- Secured partnerships and funding to support sustained club operations, growth, and national visibility.
- Featured in media interviews with **SKA**, **SABC News**, and **eTV**, highlighting the club's role in advancing astronomy outreach in South Africa. [🔗 Crazy-TV](#), [🔗 SABC News](#)

Skills

Technical Leadership	AI/ML strategy, Data science capability building, Cross-functional leadership, Technical roadmaps, Mentorship, Agile delivery, Enterprise AI governance.
Programming	Python, C/C++, MATLAB, R, CUDA, Shell Scripting, SQL, JavaScript.
Data Engineering	Databricks, Apache Spark, Hadoop, Kafka, Flink, ETL/ELT pipelines, Feature stores, Data lakes, Serverless architectures
MLOps & Architecture	Model deployment, CI/CD (Jenkins, GitLab), Docker, Kubernetes, Infrastructure-as-Code (Terraform), MLflow, Monitoring, Versioning, Real-time ML systems.
Machine Learning & AI	PyTorch, TensorFlow, Probabilistic ML, Distributed ML (Dask, Ray, Spark), Deep Learning, NLP, Computer Vision, Explainable AI, Optimization.
Software Engineering	Microservices, REST APIs, High-performance computing, Systems design, Git-based workflows, Production-grade ML systems.
Analytics & Visualization	Power BI, React, HTML/CSS, Dash, Interactive dashboards, Data storytelling.
Domains & Expertise	Scalable ML Platforms, Real-time Decisioning Systems, AI Innovation, Telecom ML, Insurance Risk Models, Geospatial Intelligence, AI Security & Ethics.
Languages	English (C2), Sesotho (C2), Setswana (C2), Sepedi (C2), isiZulu (C2)

Publications

ML-based Probabilistic Prediction of 2m Temperature and Total Precipitation

MOHAMED AKRAM ZAYTAR, BIANCA ZADROZNY, CAMPBELL WATSON, DANIEL SALLES CIVITARESE, ETIENNE EBEN

2022

VOS, THABANG MICHAEL MATHONSI, [THABANG LUKHETHO MASHININI](#)

- [🔗 paper](#)

Long-Range Seasonal Forecasting of 2m-Temperature with Machine Learning

ETIENNE E. VOS, [THABANG MASHININI](#), ASHLEY GRITZMA, SIBUSISIWE MAKHANYA AND CAMPBELL WATSON

2020

- 34th Conference on Neural Information Processing Systems [NeurIPS 2020].

- [🔗 paper](#) [poster](#)

Mine Worker Threshold Shift Estimation via Optimization Algorithms for Deep Recurrent Neural Network

MILKA C.I.MADAHANA, JOHN E.D.EKORU, [THABANG L.MASHININI](#), OTIS T.C.NYANDORO

2019

- 18th IFAC Symposium on Control, Optimization and Automation in Mining, Mineral and Metal Processing [MMM 2019]

- [🔗 paper](#)

Noise Level Policy Advising System for Mine Workers

MILKA C.I.MADAHANA, JOHN E.D.EKORU, [THABANG L.MASHININI](#), OTIS T.C.NYANDORO

2019

- 18th IFAC Symposium on Control, Optimization and Automation in Mining, Mineral and Metal Processing [MMM 2019]

- [🔗 paper](#)

Selected Projects

Smart Generator Optimisation

Vodacom, South Africa

SENIOR DATA SCIENTIST

Nov. 2021 – Mar. 2024

- **Problem:** National load-shedding created severe risks to network availability, requiring intelligent prioritisation of limited generator resources across thousands of sites.
- **Approach:** Designed a **constrained optimisation and graph-search framework** integrating real-time IoT telemetry, site metadata, and network alarms via **Kafka**, **PyFlink/Flink**, and **PySpark**. Optimisation models were implemented in **CVXPY** and operationalised through the **Analytics Engine**.
- **Impact:** Reduced generator fuel usage by **10%**, lowered operational costs by **30%**, improved network uptime by **5%**, and contributed to approximately **R1 billion in annual OPEX savings**.
- [🔗 Smart Generator Monitoring](#)

Tfilterspy — Bayesian Filtering Library

South Africa

CREATOR & PRINCIPAL DEVELOPER

2023 – Present

- **Problem:** Production ML systems in telecoms and insurance suffered from noisy, unreliable sensor and telematics data, degrading downstream decision-making.
- **Approach:** Designed and built a scalable **Bayesian filtering library** supporting Kalman, Particle, and custom filters, with a **Dask-backed** distributed compute layer for large-scale time-series processing.
- **Impact:** Enabled robust state estimation and signal smoothing for IoT, telematics, and risk analytics use cases; packaged with documentation and examples and published on **PyPI** for open-source adoption.
- [🔗 tfilterspy](#)

Ubunye AI Ecosystem (UAIE)

South Africa

FOUNDER & ARCHITECT

2024 – Present

- **Problem:** Enterprise data science teams lacked standardised ETL/ML workflows, leading to fragmented pipelines, duplicated effort, and fragile production systems.
- **Approach:** Architected a modular, **YAML-driven framework** with pluggable compute backends (**Pandas**, **Dask**, **Spark**), including declarative ETL orchestration (Ubunye Engines) and probabilistic/distributed ML components (Ubunye ML).
- **Impact:** Adopted within ABSA to establish organisation-wide ML standards, reusable pipelines, and feature stores improving delivery speed, reliability, and engineering maturity across teams.
- [🔗 Ubunye-AI-Ecosystems](#)

Kasi'Lam Digital Platforms

South Africa

Co-FOUNDER

2022 – Present

- **Problem:** Township SMEs faced barriers to digital adoption due to hosting costs, technical complexity, and lack of accessible platforms.
- **Approach:** Built scalable, zero-cost web platforms using **HTML**, **CSS**, **JavaScript**, and **React**, deployed via **GitHub Pages** to eliminate hosting overhead.
- **Impact:** Enabled local entrepreneurs to establish online presence, improve customer engagement, and build sustainable digital brands at no cost.
- [🔗 View Projects](#)

COVID-19 Visual Analytics Tool

IBM Research, South Africa

MACHINE LEARNING RESEARCH SCIENTIST

Apr. 2020 – Nov. 2021

- **Problem:** Public health authorities required real-time situational awareness during the COVID-19 pandemic to guide response strategies.
- **Approach:** Developed a real-time visual analytics platform using **Python**, **Dash**, and **Plotly**, deployed on **IBM Cloud**.
- **Impact:** Enabled rapid monitoring of infections, hospital utilisation, and hotspot trends, supporting data-driven public health decision-making.
- [🔗 View Dashboard](#)

Geospatial Analytics — IBM Environmental Intelligence Suite

IBM Research (USA, Brazil, South Africa)

MACHINE LEARNING RESEARCH SCIENTIST

Apr. 2020 – Nov. 2021

- **Problem:** Global enterprises required scalable monitoring and prediction of environmental and climate risks across industries.
- **Approach:** Built geospatial analytics workflows using **IBM PAIRS**, **Python/TensorFlow**, **Hadoop**, and **Apache Airflow** to process multi-terabyte spatiotemporal datasets.
- **Impact:** Contributed core analytical components to the **IBM Environmental Intelligence Suite**, enhancing environmental risk prediction and enterprise-scale monitoring capabilities.
- [🔗 Environmental Intelligence Suite](#)

Wits Course Recommendation System

University of the Witwatersrand

JUNIOR DATA SCIENTIST

Jun. 2018 – Apr. 2020

- **Problem:** First-year students lacked personalised guidance, contributing to misaligned course selection and poor academic outcomes.
- **Approach:** Developed a **K-modes clustering-based recommendation system** using **Python**, **Scikit-learn**, and **Pandas**, with outputs integrated into **PowerBI**.
- **Impact:** Achieved a **90% silhouette score** and generated over **R2 million annually** in government subsidy through improved enrolment alignment.
- [🔗 View Recommendation Engine](#)

Honors & Awards

2022	Vodacom Star Award , Recognised for innovation, impact, and engineering excellence in developing the national Smart Generator Optimisation system.	South Africa
2019	MSc Computer Science (Distinction) , Awarded for outstanding academic performance and significant contribution to research in machine learning and big data systems.	University of the Witwatersrand
2014–2017	Wits Astronomy Club — Co-Founder & Executive , Led public STEM engagement initiatives aligned with the SKA project, promoting astronomy outreach across the university and broader community.	South Africa

References

PhD	Dr. Etienne Vos — IBM Research Manager , Etienne.vos@ibm.com	IBM Research
PhD	Dr. Jacobus du Toit — Machine Learning Lead , jacoDutoit@vodacom.co.za	Vodacom
PhD	Dr. Akram Zaytar — Senior Research Scientist , akramzaytar@microsoft.com	Microsoft Research
BSc	Mr. Malachy Morrow — Principal Solution Architect , mal@malmorrow.com	Altron & Vodacom
MSc	Mrs Harshila Dulabh — Team Lead , Harshila.Dulabh@wits.ac.za	Wits University (BIS)