AKMAL MUZAKKI BAKIR

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ABOUT

Akmal Muzakki Bakir is a dedicated **Data Science undergraduate student at Telkom University**, with a strong academic record (GPA: **3.91/4**, Summa Cum Laude). He has extensive experience in **data engineering, machine learning, deep learning, and computer vision research**, particularly in **YOLOv8-based object detection, graph databases, and cloud computing**. With hands-on experience from **internships at Kalbe Nutritionals and Astra International**, as well as **research roles at BRIN and Universitas Sebelas Maret**, Akmal has developed expertise in **ETL pipelines, cloud infrastructure, and AI-driven applications**. His work spans multiple domains, including **image processing, social network analysis, and medical AI**, with contributions to **phytoplankton classification, brain tumor segmentation, and political campaign analysis**. Beyond research, Akmal is actively involved in **teaching** as a **Teaching Assistant and Practicum Assistant**, mentoring students in **algorithm complexity, programming, and statistics**. He is also a **national-level competition finalist and award-winning data scientist**, securing top positions in prestigious data science and machine learning competitions. Akmal's technical proficiency includes **Python, Java, Go, SQL, and graph databases**, with experience in tools such as **Google Cloud, Neo4j, TensorFlow, and PowerBI**. His career goal is to **leverage AI and data-driven solutions to solve complex real-world problems**, particularly in **computer vision, cloud computing, and big data analytics**.

EDUCATION

Telkom University – S1 Data Science [Cumulative GPA: **3.91/4** (Summa Cumlaude)]   **August 2021 - February 2025**

PROFESSIONAL EXPERIENCE

Telkom University — Teaching Assistant   **March 2023 - February 2024**
- **Teaching Assistant of Discrete Math:** Assisting lecturers in delivering material on logic, sets, relations, functions, combinatorics, and graphs involves creating exercises and exams related to these topics.
- **Teaching Assistant of Programming Algorithms:** Providing additional material using the Go language and pseudocode, deepening the course content through responses and interactions.
- **Teaching Assistant of Algorithm Complexity Analysis:** Assisting lecturers in teaching how to measure the efficiency of algorithms based on execution time and memory usage involves using notations such as O, Ω, Θ, o, and ω to determine the upper bound, lower bound, and tight bound of algorithm complexity.

Big Data Laboratory Telkom University — Graph Database Research   **August 2023 - September 2024**
- Develop methods and tools for visualizing graph queries and their results, including techniques like graph layouts, node-link diagrams, and matrix representations.
- Develop techniques and systems for discovering relevant graph data from heterogeneous sources, incorporating strategies such as schema matching, entity resolution, and query expansion.

Kalbe Nutritionals (PT. Sanghiang Perkasa) — Data Engineer Intern   **August 2023 - October 2023**
- Implement Extract, Transform, Load (ETL) processes using tools such as Pentaho and Airflow.
- Create database connections, run ETL procedures, and integrate Pentaho with Google Cloud Platform (GCP) for effective data warehousing implementation.

AI Laboratory Telkom University — Computer Vision Research   **September 2023 - June 2024**
- Explore the use of deep learning methods for various computer vision tasks, including multiple object tracking, video object segmentation, pedestrian trajectory prediction, visual localization, change detection, image retrieval, video forensics, and video anonymization.
- Conduct research related to computer vision with a focus on object detection. The research title is "*Trash Detection in Surface Waters using YOLOv8.*"

Students Association of Informatics — Academic Tutor   **September 2023 — November 2023**
- **Academic Tutor of Statistics and Probability:** Teach basic concepts of probability theory, including sample space, events, random variables, chance functions, distribution functions, expectations, and stochastic processes.
- **Academic Tutor of Algorithm Complexity Analysis:** Teach basic concepts such as asymptotic notation, time complexity, space complexity, auxiliary space, worst-case analysis, average-case analysis, best-case analysis, and various types of complexity.

Informatics Laboratory Telkom University — Practicum Assistant   **September 2023 - October 2024**
- **Practicum Assistant of Object Oriented Programming:** Assisting students in creating classes and objects involves defining attributes and methods, while guiding them in applying key OOP concepts such as inheritance, polymorphism, abstraction, and encapsulation.
- **Practicum Assistant of Programming Algorithm:** Assisting students in understanding the basics of Java programming, including variables, operators, and basic syntax. Guidance is provided on applying array concepts, searching, and sorting techniques.

Badan Riset dan Inovasi Nasional (BRIN) — Research Assistant   **July 2024 - Present**
- Be a part of Data Science and Information Research Center, specifically Human Computer Interaction and Visualization Research Group
- Active in research titled "*Automated Phytoplankton Segmentation and Classification Using Deep Learning: A Study on Belitung Waters Dataset*" for publication in the Journal.
- Developing a web-based application for phytoplankton segmentation and classification as part of the research titled "*Modeling Phytoplankton Segmentation and Classification in Belitung Waters*". Involves creating a deep learning model using various pretraining techniques and utilizing datasets collected from Belitung waters.

Bangkit Academy — Cloud Computing Engineer   **September 2024 - December 2024**
- Utilize Google Cloud services for database management, authentication, and serverless infrastructure, including

Firestore, Cloud Storage, and App Engine for CI/CD API production.
- Develop cloud architecture and machine learning workflows using FastAPI, Artifact Registry, Cloud Run, and Gemini Autocorrect for model deployment and API services.

Universitas Sebelas Maret — Computer Vision Research   September 2024 - Present
- Replace the YOLOv8 backbone with the proposed backbone, such as the KAN method from the convolution layer, and build an app for automated prediction effectiveness.
- Apply the *enlighten* method for image augmentation and processing, perform data preprocessing with various partitioning schemes, propose several schemes of notebook for experimentation, and end-to-end training and modeling.

Digital Talent Center Telkom University — Laboratory Assistant of Data Mining   November 2024 - January 2025
- Active as PIC of the Adikara 2024 Data Mining division, managing the competition from the preliminary Kaggle-based round to the final round and championship announcements.
- Actively opening and hosting the Adikara 2024 Data Mining competition section, and become a mentor to motivate students to take part in the Dikti competition.

PT Astra International Tbk — Data Intelligence Intern   February 2025 - Present
- Do an in class training, introduction to the Digital Strategy group work environment. Learn about Data Product, Data Engineer, Data Governance, Experimentation and Enablement, Business Intelligence, and etc.
- Be a part of the SPLASH journey, a platform used for industry orientation to expand in a region in Indonesia. The basis is, conducting a search for high potential industries that might need this product, looking for datasets to analyze and create time series modeling, integrating with PowerBI platform, and holding discussions with the SPLASH team regarding findings obtained

HIGHLIGHTED PROJECT

[Product Based – 2023]   TANGGUH: Multi Models Machine Learning Application accompanied by Support Assistant
- This machine learning website predicts stunting based on entered parameters and provides nutritional advice through chatbots.
- It uses generative AI with Gemini and GPT-4 language models to offer personalized suggestions and guidance.

[Research Based – 2023]   Community Structure Analysis K-Pop Fans on Social Media X Using Social Network Analysis Girvan-Newman Algorithm
- This study analyzes the community structure of K-Pop fans on platform X using Social Network Analysis (SNA) with the Girvan-Newman Algorithm.
- After preprocessing and adding "total_interaction," a network graph was created with NetworkX, and then the Girvan-Newman algorithm identified 12 communities with a peak modularity of 0.79268.

[Research Based – 2023]   Network Structure Analysis of #FreePalestine Communication on Social Media X Using Social Network Analysis
- This analysis aims to assess the communication, information dissemination, and media influence in Indonesia regarding the Palestine-Israel conflict on platform X.
- Python's NetworkX library was utilized to visualize graphs and interactions, and to analyze centrality measures such as degree, betweenness, and closeness centrality related to the conflict.

- The image-based text recognition system for the Sirekap case uses Optical Character Recognition (OCR) with OpenCV and Python to detect text in images resulting from sound calculations.
- It implements CTC loss and RCNN within the tf-keras module for improved text recognition accuracy.

[Research Based – 2024]   Trash Detection in Surface Waters using YOLOv8
- YOLOv8 architecture was used for single-class trash detection in surface water.
- Evaluations using the FloW-Img and WaterTrash datasets showed that the YOLOv8x model achieved the highest mAP50 score of 0.923, with minimal performance variation across different model sizes.

[Product Based – 2024]   MOODIFY: Anxiety and Stress Detection System Deep Learning Based with an Assistant Supporters
- This research develops a web-based application using AI to help users manage stress and anxiety by predicting stress levels and providing recommendations.
- It employs models such as Ensemble Gradient Boosting, Stacked Bi-LSTM, Gemini, Gemma, Llama2, GPT-4, and RAG, trained on synthetic tabular data and relevant text from Kaggle.

[Research Based – 2024]   Pemilu Multiclass Text Classification using NNLM and Variational BERT
- This research focuses on multiclass text classification using transformer architectures (BERT, RoBERTa, IndoBERT, IndoBERTweet) and deep learning models (pretrained NNLM, Bi-LSTM).
- It also employs ensemble gradient boosting methods from traditional machine learning, and also this research use several preprocessing techniques including word importance, back translation, synonym replacement, and feature extraction.

[Research Based – 2024]   Campaign Topic Analysis and Social Networks on Social Media X
- This research analyzes election topics from large datasets collected over one month from social media platform X using topic modeling and social network analysis.
- It employs dynamic topic modeling with the IndoBERTopic architecture (using embeddings from IndoBERTweet) and community detection for network analysis.

[Product Based – 2024]   PlanktoScan: Phytoplankton Segmentation and Classification Modelling App
- This study focuses on the automatic identification of phytoplankton species using two modeling flows: segmentation followed by classification.
- The segmentation models used are DeepLabV3+, U-Net, and SegNet with a ResNet50 encoder, while the classification models include Vision Transformers, BigTransfer, Swin Transformers, RegNet, and ConvNext with a concatenate layer on the transformers architecture. And then, a web-based application was also developed using HTML and CSS for the

frontend, and JQuery and Flask for the backend.

[Research Based – 2024] MRI Image Segmentation and Classification of Brain Tumors using Various DeepLabV3+ and Swin-ViT
- This research focuses on brain tumor segmentation and classification from MRI images using deep learning approaches.
- It employs DeepLabV3+ with various backbones (ResNet50, ResNet101, ResNet152, DenseNet121, DenseNet169, MobileNet) for segmentation and uses Vision Transformers and Swin Transformers with modified patch architectures and image sizes for classification.

[Research Based – 2024] AXAP-NET: Axial Attention Pyramid Unet for Polyp Image Segmentation
- This study integrates global spatial attention, attention Transformers, and parallel axial attention with U-Net to improve feature representation based on relevance for the polyp disease problem.
- This study replaces skip-connection with Feature Pyramid Network (FPN) in the basic U-Net model.

[Product Based – 2024] Signify – Sign Language and Communication Aid
- This mobile-based application integrates AI technology for real-time hand gesture detection with AI-based autocorrect, featuring video tutorials and quizzes for learning development.
- It uses Android Jetpack for the frontend, FastAPI, Express.js, and Google Cloud Platform products for the backend, and employs CNN and Mediapipe for the AI system.

[Research Based – 2024] TriDa – Trial-Channel Double Attention Feature Integration for Fall Detection using Ensemble Machine Learning Models
- The objective of this research is to develop an accurate and reliable real-time fall detection system to reduce the risks associated with delayed response.
- The study aims to enhance detection accuracy while minimizing false positives and negatives by integrating a Trial-Channel Double Attention (TriDA) framework such as using CBAM, Mediapipe Pose, YOLOv8-Pose, and also Spine Vector Extraction method, with ensemble machine learning models.

[Research Based – 2024] Sequence-Based Anomaly Detection in Gas Pipeline Systems: Combining Seasonal Decomposition and Level Shift with Deep Learning Models
- Gas pipeline infrastructure plays a crucial role in ensuring the supply of essential energy for electricity and industrial needs worldwide.
- This research combines a hybrid framework such as classical methods (Seasonal Decomposition and Level Shift Anomaly Detection) with modern deep learning techniques (LSTM and VAE-GAN).

HONORS AND AWARDS

Finalist – LMNas UGM-31 Math Competition **[National, 2019]**
3rd Bronze Medalist [80+ Competitors] – District-Level Math KSM **[National, 2020]**
Finalist – Optika UIN Jakarta **[National, 2020]**
Gold Medalist [1000+ Competitors] – Indonesian Science Competition for Math **[National, 2023]**
Gold Medalist [1000+ Competitors] – Olimpiade Sains Pemuda for Math **[National, 2023]**
Finalist (Top 10) [120+ Competitors] – Data Slayer 1 Machine Learning Competition **[National, 2024]**
Top 10 [223 Competitors] – Datathon RISTEK UI **[National, 2024]**
Finalist (Top 12) [1000+ Competitors] – Big Data Challenge at Satria Data 2024 **[National, 2024]**
Scholarship Awardee – Data Science Class of Skill Academy by Ruangguru **[National, 2024]**
Finalist (Top 10) [100+ Competitors] – Objective Quest Dataquest by Airnology 2024 **[National, 2024]**
3rd Bronze Medalist [1000+ Competitors] – Data Mining at GEMASTIK 2024 **[National, 2024]**
3rd Winner [80+ Competitors] – Scientific Paper Competition of Data Science by ACTION UNESA **[National, 2024]**
Speaker Invitation – Upscaling Skills Training: Python for Data Science on Himikan Unpad **[National, 2024]**
2nd Winner [250+ Competitors] – Data Slayer 2 Machine Learning Competition **[National, 2024]**
Top 50 [644 Competitors] – Product Track Capstone Project at Bangkit Academy 2024 H2 **[National, 2025]**
Top 5 [677 Competitors] – Capstone Project at Bangkit Academy 2024 H2 **[National, 2025]**
Conference Presenter and First Author – ICADEIS 2025 **[International, 2025]**
Top 1 [900+ Participants] – Programming ML Predict on Kaggle at ADIIP 2025 **[National, 2025]**

SKILLS

Programming Language	Python (Primary Language), Java, GO, Javascript (React.JS, VanillaJS, ExpressJS), HTML, CSS
Databases	MySQL, PostgreSQL, MongoDB, Neo4j, ArangoDB, Nebula Graph, Firebase
Tools	Git, Github, Jupyter Notebook, VS Code, Jetbrains Product, Tableau, PowerBI, Microsoft Azure, Google Cloud Platform, Apache Hadoop, Spark, Cassandra, HBase, Docker
Related Fields	Cloud Computing Engineer, AI/ML Engineer, Data Engineer, Data Science, Data Analyst, Computer Vision Engineer, NLP Engineer, Teaching