

Aryo Pradipta Gema

☎ +44 7476 686838 | @ aryopg@gmail.com | 🔗 LinkedIn | 🐦 Twitter | 🌐 GitHub | 🌐 Website | 📍 Edinburgh, UK

SUMMARY

Aryo is currently a PhD student in Biomedical AI at the University of Edinburgh under the supervision of Dr. Beatrice Alex, Dr. Pasquale Minervini, and Dr. Luke Daines. His research interests are in the intersection between NLP and the clinical domain. Specifically, He is interested in retrieval-augmented clinical LLMs and the efficient adaptation of LLMs for clinical NLP tasks through parameter-efficient fine-tuning techniques.

EDUCATION

University of Edinburgh

Edinburgh, United Kingdom

PhD in Biomedical AI

Sep 2023 – Present

- **Thesis:** Knowledge-Augmented Language Models for Patient Information Modelling.
- **Projects:** Survey of Knowledge-augmented Biomedical and Clinical Language Models; Probing evaluation of Language Model in encoding clinical knowledge; LLM-enhanced synthesis of Discharge Summaries from ICD codes; Unifying embeddings of Molecular Language Models for Protein-Ligand binding affinity prediction.
- **Advisors:** Dr. Beatrice Alex, Dr. Pasquale Minervini, and Dr. Luke Daines.

MSc by Research in Biomedical AI; 1st

Sep 2022 – Aug 2023

- **Thesis:** Parameter-efficient Fine-tuning of Large Language Models for the Clinical Domain.
- **Projects:** Systematic Review of NLP methods for detecting adverse drug events; Biomedical knowledge graph embedding for polypharmacy tasks; Protein Language Model for SARS-CoV-2 vaccine design.
- **Advisors:** Dr. Beatrice Alex, Dr. Pasquale Minervini, and Dr. Luke Daines.

Bina Nusantara University

Jakarta, Indonesia

BSc in Computer Science; GPA: 3.87/4.00

Sep 2014 – Aug 2018

- **Thesis:** Sequence-To-Sequence Learning For Motion-Aware Claim Generation.
- **Projects:** Energy-based learning for recognising argumentative relations in persuasive essay; Attention mechanism model for recognising insufficiently supported arguments; Attention-based argumentation mining.
- **Advisors:** Dr. Derwin Suhartono.

PROFESSIONAL EXPERIENCE

Epigene Labs (AI-driven Precision Oncology startup)

Paris, France

Senior Data Scientist

October 2021 – August 2022

- Supervised data collection, data labelling, ontology formulations, and model evaluations.
- Maintained the quality of more than 20 Machine Learning models in production.
- Worked with the Head of Data to align Data Science research and product timelines.
- Supervised data science internship projects on NLP-based biomedical concept extraction.
- Initiated a regular inter-departmental research workshop.

Data Scientist

October 2019 – September 2021

- Researched and implemented a Language-Agnostic, Format-Agnostic, and Cancer-Agnostic Data Harmonisation Pipeline using hybrid Machine Learning techniques.
- Supervised data science internship projects on Tailored Performance Metrics and Continuous Learning.
- Contribute to an open-sourced batch effect correction library (<https://github.com/epigenelabs/pyComBat>).
- Directly worked under the C-level to align data science research, DevOps, and product timelines.

Riminder (now HrFlow; Recruitment solution startup)

Paris, France

Staff AI Research Scientist

February 2019 – October 2019

- Supervised day-to-day operations of the research team.
- Directly worked with the C-level to align research and product timelines.
- Improved in-house Named Entity Recognition model by 20% F1 score, block tagger, and other ML models by 5%.

- Contributed to the research team to further improve profile-to-job matching/recommendation using deep learning algorithms.
- Introduced novel approaches for profile-to-job matching, and improved the model by a 10% ROC AUC score.
- Held ownership of multiple of Riminder's highest-valued projects.

Julo (AI-driven financial technology startup)

Jakarta, Indonesia

Data Scientist

September 2017 – July 2018

- Developed multiple machine learning solutions, including Automatic individual credit performance grading, deep learning-based supervised and unsupervised text processing, and recognition.
- Worked collaboratively with the Head of Analytics in day-to-day development and recruitment.
- Designed and supervised data collection, data labelling, and evaluations.
- Mentored junior data scientists and interns.

Bina Nusantara University

Jakarta, Indonesia

Undergraduate Researcher; placement programme

March 2017 – July 2018

- Researched cutting-edge Deep Learning and other Machine Learning techniques in Argumentation Mining.
- Published 3 papers in 2 international conferences and 1 journal (ICCCSCI 2017, MIWAI-SoDeLIA 2017, IJCVR 2018).
- Best Presenter of ICCSCI 2017.
- Appointed as the lead researcher for the team of undergraduate researchers.

RE/MAX 2000 (real-estate company)

California, United States (Remote)

Freelance Full Stack Software Engineer

July 2017 – September 2017

- Developed 10 core modules for internal Customer Relationship Management (CRM) application.
- Developed 8 core modules for Image and Descriptive Text Verification applications.
- Developed 5 WordPress-based websites.

Volantech (B2B software house)

Jakarta, Indonesia

Software Engineer

February 2016 – July 2017

- Developed Customer Relationship Management (CRM) applications for mining companies.
- Held ownership of multiple of Volantech's high-value projects.
- Worked closely with the C-level in developing product timelines.
- Research on Deep Learning techniques in conjunction with Internet of Things systems.

PUBLICATIONS**Preprint (in submission)**

- **Gema, A.**, Daines, L., Minervini, P., Alex, B. (2023). *Parameter-Efficient Fine-Tuning LLaMA for the Clinical Domain*. arXiv preprint arXiv:2307.03042.
- **Gema, A.**, Grabarczyk, D., De Wulf, W., Borole, P., Alfaro, J., Minervini, P., Vergari, A., Rajan, A. (2023). *Knowledge Graph Embeddings in the Biomedical Domain: Are They Useful? A Look at Link Prediction, Rule Learning, and Downstream Polypharmacy Tasks*. arXiv preprint arXiv:2305.19979.
- **Gema, A.**, Kobiela, M., Fraisse, A., Rajan, A., Oyarzun, D., Alfaro, J. (2023). *Vaxformer: Antigenicity-controlled Transformer for Vaccine Design Against SARS-CoV-2*. arXiv preprint arXiv:2305.11194.

In proceedings

- Halimawan, N., Suhartono, D., **Gema, A.**, Yunanda, R. (2022). BERT and ULMFiT Ensemble for Personality Prediction from Indonesian Social Media Text. In 2022 International Symposium on Information Technology and Digital Innovation (ISITDI) (pp. 156–161).
- William, D., Achmad, S., Suhartono, D., **Gema, A.** (2022). Leveraging BERT with Extractive Summarization for Depression Detection on Social Media. In 2022 International Seminar on Intelligent Technology and Its Applications (ISITIA) (pp. 63–68).
- Saputra, F., Namyu, U., Suhartono, D., **Gema, A.** (2021). Automatic Piano Sheet Music Transcription with Machine Learning. *Journal of Computer Science*, 17(3), 178–187.
- Suhartono, D., **Gema, A.**, Winton, S., David, T., Fanany, M., Arymurthy, A. (2020). Sequence-To-Sequence Learning For Motion-Aware Claim Generation. *International Journal of Computing*, 19(4), 620–628.
- Suhartono, D., **Gema, A.**, Winton, S., David, T., Fanany, M., Arymurthy, A. (2020). Argument annotation and analysis using deep learning with attention mechanism in Bahasa Indonesia. *Journal of Big Data*, 7, 1–18.

- Suhartono, D., **Gema, A.**, Winton, S., David, T., Fanany, M., Arymurthy, A. (2019). Attention-based argumentation mining. *International Journal of Computational Vision and Robotics*, 9(5), 414–437.
- Anderson, R., **Gema, A.**, Isa, S., others (2018). Facial attractiveness classification using deep learning. In 2018 Indonesian Association for Pattern Recognition International Conference (INAPR) (pp. 34–38).
- Suhartono, D., **Gema, A.**, Winton, S., David, T., Fanany, M., Arymurthy, A. (2017). Hierarchical attention network with XGBoost for recognizing insufficiently supported argument. In *Multi-disciplinary Trends in Artificial Intelligence: 11th International Workshop, MIWAI 2017, Gadong, Brunei, November 20-22, 2017, Proceedings 11* (pp. 174–188).
- **Gema, A.**, Winton, S., David, T., Suhartono, D., Shodiq, M., Gazali, W. (2017). It takes two to tango: modification of siamese long short term memory network with attention mechanism in recognizing argumentative relations in persuasive essays. *Procedia computer science*, 116, 449–459.

In preparation

- Falis, M., **Gema, A.**, Dong, H., Daines L., Birch, A., Alex B.. *Can GPT-3.5 Generate and Code Discharge Summaries?*
- **Gema, A.**, Wu, J., Kalam, A., Shi, D., Song, Z., Falis, M., Wu, H., Daines L., Minervini, P., Alex B.. *Survey of Knowledge-augmented Biomedical and Clinical Language Models.*
- Guellil, I., Wu, J., **Gema, A.**, Francis, F., Berrachedi, Y., Chenni, N., Tobin, R., Llewellyn, C., Arakelyan, S., Wu, H., Guthrie, B., Alex, B.. *Natural Language Processing for Detecting Adverse Drug Events: Systematic Review.*

INVITED TALKS

- **Parameter-efficient Fine-tuning of Large Language Models for the Clinical Domain**, November 2023, Bina Nusantara University
- **Knowledge Graph Embeddings in the Biomedical Domain**, November 2023, University of Edinburgh
- **Parameter-efficient Fine-tuning of Large Language Models for the Clinical Domain**, October 2023, University of Edinburgh
- **Introduction to the Large Language Model**, July 2023, Sutton Trust Summer School
- **Knowledge Graph Embeddings in the Biomedical Domain**, May 2023, Bina Nusantara University
- **Knowledge-Augmented Clinical Language Models**, May 2023, Bina Nusantara University
- **ChatGPT: A Biomedical AI Perspective**, May 2023, University of Edinburgh
- **Knowledge-Augmented Clinical Language Models**, March 2023, Bina Nusantara University
- **Clinical Language Models**, February 2023, Bina Nusantara University
- **Building a Knowledge Base from Biomedical Literature**, July, 2022, Bina Nusantara University
- **Augmenting Intelligence to Drug Discovery**, December, 2021, Bina Nusantara University
- **Augmenting Intelligence to Drug Discovery**, April, 2021, Bina Nusantara University
- **Introduction to Artificial Intelligence**, October, 2020, Bina Nusantara University

AWARDS & ACHIEVEMENTS

Academic

- **Binusian Award (2018)**: awarded to the most achieving graduate.
- **Applied Research Grant Binus (2017)**: awarded to research initiatives by Binus University.
- **Scholarship Mentor Program (2015)**: awarded to students that successfully mentor their peers.
- **Student of Excellence Honour (2015)**: awarded to students with international and national achievements.
- **Student of Excellence Honour (2014)**: awarded to students with international and national achievements.

Non-academic

- **United Asian Debating Championship (2015)**: Quarterfinalist in English as Foreign Language Category.
- **Asian Law Students' Association University of Indonesia (2015)**: Octofinalist.
- **Asian Law Students' Association Universitas Padjadjaran (2015)**: Semifinalist and 8th Best Speaker.
- **Indonesian Varsity English Debate University of Indonesia (2015)**: Champion in Novice Category.
- **Founder's Trophy Debating Championship University of Indonesia (2014)**: Best Novice Team.
- **Newbies Debating Championship University of Indonesia (2014)**: 1st Runner Up and 3rd Best Speaker.

SKILLS

Languages: Indonesian – Native, Banjarese - Native, English – Bilingual, French – Elementary

Programming Languages: Python, C/C++, Go, JavaScript, SQL

Libraries: PyTorch, TensorFlow, Transformers, Accelerate, Scikit-Learn, NumPy, Pandas, Matplotlib, Seaborn

Technologies: Git, Slurm, Docker, Kubernetes, Flask, Streamlit, MySQL, PostgreSQL, MongoDB, Azure Cosmos DB

Other interests: Chess, Parliamentary Debate, Sports, Cooking