Aidar Amangeldi

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EDUCATION

Nazarbayev University, Astana, Kazakhstan
MSc in Data Science'26
BSc in Computer Science'24
Relevant Courses: *Data Mining and Decision Support, Artificial Intelligence, Linear Algebra, Big Data Analytics, Discrete Mathematics, Probability and Statistics for DS, Computer Vision*

WORK AND ACADEMIC EXPERIENCE

Research Assistant — Embedded Systems and AI (ESAI) lab (Prof. Jurn-Gyu Park) *Astana, Kazakhstan*
August 2022 - Present
My research was devoted for characterizing Vision Transformer and CNN workloads on Embedded Systems (NVIDIA Jetson TX2) and developing CPU-GPU integrated DVFS governor algorithms to reduce the power consumption without accuracy and performance loss:

- Published two papers in IEEE journal and conference
- Measuring and evaluateing power consumption, time performance and energy-delay-product metrics of the default and proposed CPU/GPU governors
- Customizing tegrastats parser in Python for the research needs
- Developing Dynamic Frequency Scaling algorithms to improve CPU/GPU utilization during the CNN/ViT object detection on mobile/embedded systems

Data Science intern — Institute of Smart Technologies and Artificial Intelligence (ISSAI) *Astana, Kazakhstan*
May 2022 – August 2022

- Contributed to the development of the first Central Asian dishes dataset, including data collection, annotation, and quality control; published in MDPI.
- Web scraped images for 10 Central Asian dishes with over 6000 items in total
- Carried out data cleaning, iterative annotation, and multiple inspections
- Trained dataset on YOLO/ResNet for 8 food classes with 80% accuracy and overall Precision/Recall/F-1 of 0.83/0.80/0.87 per each metric

RESEARCH PROJECTS

CNN vs. ViT Performance comparison on Tiny ImageNet and DermaMNIST (Course Project, Prof. Jurn-Gyu Park) (arXiv)

- Conducted a systematic comparison of ResNet18 and Vision Transformer variants (Tiny, Small, Base, Large) for both medical and general-purpose image classification.
- Developed and implemented a fine-tuning strategy with structured hyperparameter variation to optimize accuracy–efficiency trade-offs.
- Achieved 3–4× faster inference and 75% parameter reduction with ViT-Small (Patch 16) while maintaining accuracy within 3% of the best-performing model.

Congenital Heart Disease Recognition using Deep Learning/Transformer Models (Course Project, Prof. Khalil Khan) (arXiv)

- Conducted a study employing deep learning models on combined audio (ZCHSound) and image (DICOM Chest X-ray) datasets for CHD diagnosis.
- Applied advanced preprocessing (contrast enhancement, histogram equalization, Gaussian blur) and augmentation to improve generalization on small, imbalanced medical datasets.
- Implemented late-fusion strategies (accuracy-weighted, class-weighted, meta-ensemble logistic regression) achieving 73.9% accuracy on ZCHSound audio and 80.72% on pediatric CXR classification.

Removal of Text in Images (Course Project, Prof. Zhanat Kappassov) (GitHub)

- Designed and implemented an image-processing pipeline for automated text detection and removal while preserving background integrity.
- Applied median filtering, histogram equalization, and Google Cloud Vision API for OCR-based text localization.
- Developed inpainting and smoothing algorithms to reconstruct background, achieving visually consistent results on varied scenes.

Publications and Acknowledgments

J.-G. Park, **A. Amangeldi**, N. Fakhrutdinov, M. Karzhaubayeva, and D. Zorbas, "Patch and Model Size Characterization for On-Device Efficient-ViTs on Small Datasets Using 12 Quantitative Metrics," *IEEE Access*, 2025, link.

M. Karzhaubayeva, **A. Amangeldi** and J. -G. Park, "CNN Workloads Characterization and Integrated CPU-GPU DVFS Governors on Embedded Systems," in *IEEE Embedded Systems Letters*, link.

Acknowledgments in: Karabay, A.; Bolatov, A.; Varol, H.A.; Chan, M.-Y. "A Central Asian Food Dataset for Personalized Dietary Interventions." Nutrients 2023, 15, 1728. link

TEACHING EXPERIENCE

Teaching Assistant – Computer Networks (Prof. Dimitrios Zorbas) *Nazarbayev University, Spring 2025*

- Assisted in delivering lectures and facilitating lab sessions for undergraduate students on core networking concepts, including TCP/IP, routing protocols, and network security.
- Graded assignments, midterm, and final exams, ensuring timely and constructive feedback.

SKILLS

- **Languages:** Python (NumPy, Pandas, matplotlib, Seaborn), C++, Bash, SQL
- **Technologies:** scikit-learn, PyTorch/TensorFlow, OpenCV,LaTeX, Git
- **Relevant skills:** Data mining, wrangling, cleaning and modeling with further analysis and visualization, Web scraping, Clustering and classification, Data visualization, Experimental design, Statistical analysis, Scientific writing, Literature review