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Hieu (Ian) Vu

AI Research Engineer / Applied Scientist

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Summary

I consider myself a novice trying to get out of Dunning-Kruger's Valley of Despair, an individual who is intellectually curious, passion-driven and eager to make meaningful impacts. I have been working in the industry for over 4 years, focusing on developing AI solutions for Key Information Extraction from business documents. However, my interest does not lie within said domains and I am open to any interesting topic/problem. I am looking for opportunities where I could stay current with the literature, develop and implement AI solutions that people enjoy using.

- 4 years of experience in AI/DL, mostly focused on Document Image Understanding.
- Co-authored 3 peer-reviewed papers on Information Extraction, including 1 Best Paper Award at DIL@ICDAR 2021.
- Bachelor of Computer Science (Honours Programme) - Highest Ranking Graduate.

Experience

AI Researcher/Engineer **Nov 2018 — Present**
Cinnamon AI *Hanoi, Vietnam*

- **Researched, developed, and implemented AI solutions for client projects and internal usage.**
  - **Co-authored 3 peer-reviewed papers** on Key Information Extraction.
  - **Developed AI solutions for Key Information Extraction on document images of a low-resource language**: Implemented MVLM pre-training task for LayoutLM (and variants), adapted the English pre-trained weights to a low-resource language (Japanese), pre-trained and fine-tuned it on several client data sets, which **increased the f1-score by 2% - 7%**.
  - **Developed solutions for localizing and extracting documents from scanned images containing multiple documents** using Image Processing techniques and Deep Learning models, **achieved 85%+ IoU score**.
  - **Worked on Document Image Classification**, **over 85% accuracy** achieved on a client data set with **20+ classes**.
  - **Worked on Object Detection on Document Images**: such as detecting logos, stamps, check marks, etc.
  - **Performed Data Synthesis/Augmentation** using image processing techniques for overcoming data shortage.
  - Other: Benchmarked internal AI solutions, Text Segmentation, printed/handwriting OCR, handled AI pipeline on client projects, contributed to several internal libraries.
- **Developed data-driven products and processes.**
  - **Developed synchronization and local version control features** for the CLI tool, used by AI Engineers and Researchers to query data from a central database and manage the local copy.
  - **In charge of data-related objectives on the department road map**: lead discussions, identify issues, propose solutions, decide action items for data centralization, data management, data integrity, labeling UI improvement, central database design, etc.
  - **Taking part in revamping the internal data management system**: Develop a new standardized label format, redesign database schema, develop data sharing hub.
  - **Initiated and took charge of data standardization**: defined and implemented processes regarding data life cycle and organization, enabling data sets from different client to be re-useable collectively.
- Other tasks: Supporting cross-department alignment; Conducting/Facilitating technical sharing sessions; Training/Mentoring;.
- Tools and technologies
  - Mainly used: **Python, Pytorch, Tensorflow/Keras, Transformers (Hugging Face), Git, OpenCV, Scikit-learn LaTeX.**
  - Also familiar with: DVC, Neptune, CircleCI, Jenkins, Docker, KubeFlow, Elasticsearch.
  - Environments: GCP, AWS, Linux, Windows.

Undergraduate Research Assistant **Aug 2017 — Sep 2019**
IOT Lab, University of Engineering and Technology - Vietnam National University, Hanoi *Hanoi, Vietnam*

- **Contributed to the Machine Learning Toolkit of the Well Insight platform**
  - **Built predictive models for geophysical data** using machine learning and statical methods.
  - Worked in conjunction with Front-end/Back-end Engineers and domain experts to ensure requirements are met.
  - Problem worked on: Facies/rock type classification; Time series prediction on well-logs data; Permeability regression; Integrated Prediction Error Filter Analysis (INPEFA) curve calculation; Cumulative and Federated learning for well-logs data.
- Tools and technologies: Python, Keras/Tensorflow, OpenCV, Scikit-learn,XGBoost, Javascript.

Publications

1 Nguyen, Bao-Sinh, Tien Dung Le, **Hieu M Vu**, Tuan-Anh D Nguyen, Minh-Tien Nguyen, and Hung Le (2023). "Improving Document Image Understanding with Reinforcement Finetuning". In: ed. by Mohammad Tanveer, Sonali Agarwal, Seiichi Ozawa, Asif Ekbal, and Adam Jatowt. **Oral presentation**, pp. 51–63.

2 Son, Nguyen Hong, **Hieu M Vu**, Tuan-Anh D Nguyen, and Minh-Tien Nguyen (2022). "Jointly Learning Span Extraction and Sequence Labeling for Information Extraction from Business Documents". In: *2022 International Joint Conference on Neural Networks (IJCNN)*. **Oral presentation**. IEEE, pp. 1–8.

3 Nguyen, Tuan-Anh D, **Hieu M Vu**, Nguyen Hong Son, and Minh-Tien Nguyen (2021). "A Span Extraction Approach for Information Extraction on Visually-Rich Documents". In: *Document Analysis and Recognition–ICDAR 2021 Workshops: Lausanne, Switzerland, September 5–10, 2021, Proceedings, Part II 16*. **Best Paper Award, DIL - ICDAR 2021**. Springer, pp. 353–363.

4 **Vu**, **Hieu M** and Diep Thi-Ngoc Nguyen (2020). "Revising FUNSD dataset for key-value detection in document images". In: *arXiv preprint arXiv:2010.05322*.

Education

Bachelor Degree, Computer Science (Honours Programme) **Sep 2016 — Aug 2020**
University of Engineering and Technology - Vietnam National University, Hanoi *GPA: 3.83/4.00*

- **Highest Ranking Graduate**
- Merit for Excellent Graduation Certificate recipient.
- Excellent Thesis Defence Certificate recipient.
- Excellent Student Certificate recipient (3 times).
- Academic Encouragement Scholarship recipient (4 times).

Honours and Awards

Best Paper Award **Sep 2021**
ICDAR 2021, Workshop on Document Images and Language

Paper title: A Span Extraction Approach for Information Extraction on Visually-Rich Documents

Accepted for oral presentation and awarded the Best Paper Award at Workshop on Document Images and Language, ICDAR 2021.

Top 4 Zalo AI Challenge 2018 - Voice Track **Sep 2018**
Zalo, VNG Corporation (Individual participant)

Finished at 4th place on the Private Leaderboard of the Voice Gender/Accent Classification challenge.

Zalo AI Challenge 2018 is a Kaggle-like competition hosted by Zalo - one of the biggest tech companies in Vietnam. The competition attracted over 700 teams competed in 3 challenges.

Certificate of Highest Ranking Graduate
University of Engineering and Technology - Vietnam National University, Hanoi

Awarded to students graduate with the highest GPA amongst the graduating class.

Skills

Programming	**Python, Git, LaTeX**, MarkDown, Java, C/C++, SQL, SPRQL.
Tools and Library	**Pytorch, Transformers (Hugging Face)**, Tensorflow/Keras, Notebook, Github, OpenCV, Scikit-learn, Docker, LibROSA.
AI Domains	**Information Extraction**, Document Intelligence, Document Understanding, Data Science, Natural Language Processing, Computer Vision.
Environments	GCP, AWS, Linux, Windows.
Languages	Vietnamese (native), English (fluent), Japanese (JLPT N4).
Misc	Problem Solving, Attentive to detail, Presentation, Communication, Academic Research (Google Scholar profile).

Projects

Data Utility Improvement Experiment for DECAF **Oct 2022 —- Nov 2022**
Personal research

- Studied about Causal Inference, Algorithmic Fairness and specifically the paper DECAF: Generating Fair Synthetic Data Using Causally-Aware Generative networks.
- Conducted experiments on improving data utility of the DECAF method using alternating graph during synthesization while still achieving similar level of fairness.
- Gave discussion and suggestions on the choice of data utility metrics.

Voice Gender/Accent Classification **Aug 2018 — Sep 2018**
Zalo AI Challenge 2018

- **4th place** on the Private Leaderboard, achieved **79.208% accuracy**.
- Individual participant, participated only during the last 10 days/1 month+ of the competition.
- Problem description: Classify the speaker's voice in a recording (typically under 3 seconds) by gender(male/female) and regional accent (northern/central/southern).
- About the competition: Zalo AI Challenge 2018 is a Kaggle-like competition hosted by Zalo - one of the biggest tech companies in Vietnam. The competition attracted over 700 teams competed in 3 challenges.

Electric Meter OCR **Oct 2019 — Nov 2019**
University Coursework Project

- Achieved **0.08 on edit distance** while having the size of just **under 10MB** and processing time of under **0.3 seconds** per image on a normal laptop.
- Problem description: Extract the value on the dial from images of electric meters. The solution is meant to be used in embedded hardwares.

Outreach

Cinnamon AI Global Bootcamp 2022
Mentoring

- Mentored a group of 4 students. The team eventually won the 2nd prize for their graduation project.
- (These kids are amazing, far more gifted than I could ever be.)
- Contributed to syllabus design, contributed questions to the entrance test, interviewed candidates.

Cinnamon AI Taiwan Bootcamp 2020
Teaching/Mentoring

- Prepared materials and gave lectures on Language modelling and Transformers to a class of 15 students, most of them hold a Master degree or are Master students. Also mentored a group of 3.
- Contributed to syllabus design, interviewed candidates.