

AKSHAY JOSHI

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EDUCATION

Master of Science Research Thesis

ETH Zürich, Zürich, Switzerland

Research Area: Vision & Language, Visual Reasoning

Feb 2022 - Present

Advisor: Prof. Dr. Mrinmaya Sachan

Master of Science, Data Science & Artificial Intelligence

Universität des Saarlandes, Saarbrücken, Germany

Research Area: Natural Language Understanding

Oct 2019 - Present

GPA: 2.0/5.0

Advisor: Prof. Dr. Josef van Genabith

Bachelor of Engineering, Computer Science & Engineering

Visvesvaraya Technological University, Karnataka, India

Research Area: Distributed Computing, Security

Aug 2013 - Jun 2017

GPA: 8.03/10

Advisor: Prof. Dr. Shashikumar D R

PUBLICATIONS

- **Akshay Joshi**, Ankit Agrawal, Sushmita Nair, “*Art Style Classification with Self-Trained Ensemble of AutoEncoding Transformations*”, arXiv:2012.03377, 2020.

EXPERIENCE

Joint Research Thesis

Google Research, Zürich, Switzerland

Feb 2022 - Present

Advisors: Dr. Alessio Tonioni, Dr. Henry Rebecq

- Collaborating with the Machine Perception team at Google to develop novel self-supervised Multimodal Transformer architectures, and large-scale vision-language pretraining objectives for representation learning of densely structured scientific diagrams.
- Investigating structural parsing, semantic interpretation & multi-hop reasoning in the context of Diagram Question Answering & Cross-Modal Retrieval.
- Setup a Mechanical Turk task to congregate a 1 million large open-source diagram dataset which would be released to the research community for large-scale self-supervised Vision-Language model pretraining.

Joint Research Thesis

German Research Center for AI, Saarbrücken, Germany

Feb 2022 - Present

Advisors: Dr. Cristina E. Bonet, Yasser Hamidullah

- Conducting research in the Machine Translation group at the Multilinguality and Language Technology research department to focus on the language modeling aspect of the proposed multimodal learning system.
- Devising novel methods to efficiently encode extremely long diagram descriptions/captions & multimodal fusion strategies to mitigate strong priors imposed by language.

Deep Learning Research Assistant

German Research Center for AI, Saarbrücken, Germany

Nov 2020 - Present

Advisors: Prof. Dr. Peter Loos, Peter Pfeiffer

- Developing novel & explainable self-supervised Transformer-based language model architectures for Biomedical Natural Language Understanding.
- Achieved state-of-the-art results in PubMedQA, EBM PICO, BC5-disease & BIOSSES downstream tasks in the Microsoft BLURB Biomedical NLP benchmark.
- Built highly parallel & computationally efficient Semantic Search (retrieves & ranks ~2 million documents in <3 sec) & Recommendation System for Smart Vigilance in Medical Product Research & Development.

Graduate Teaching Assistant

Saarland University AI Group, Saarbrücken, Germany

Oct 2020 - Mar 2021

Advisor: Prof. Dr. Jana Koehler

- Tutored & graded the ‘Architectures for Intelligent Systems’ course, which had a cohort of ~45 M. Sc. students from Computer/Data Science, Embedded Systems, Visual Computing, and Bioinformatics majors.

- Developed a reference architecture & corresponding architectural design documents for an inexpensive cloud-powered Conversational Question Answering Smart Digital Assistant.

Software Engineer I

Aug 2018 - Sep 2019

AMD Research & Development, Bangalore, India

- Implemented platform initialization routines of the off-chip phase of Platform Security Processor (PSP) firmware for Ryzen 3000 (Matisse & Castle Peak architecture) processors in ~5 months.
- Extended & validated the support for Microsoft PlayReady DRM protection technology in PSP firmware for Ryzen Pinnacle & Raven Ridge family of desktop & mobile x86 processors in 3 months.
- Developed python scripts to automate the building & validation of BIOS patches for RyzenFall, MasterKey, Fallout, Chimera, and other vulnerabilities affecting the secure chip-on-chip processor in <6 months.

Software Engineering Intern

Feb 2018 - Aug 2018

AMD Research & Development, Bangalore, India

- Developed & validated the AMD Ryzen Master Software Development Kit for CPU/Memory Overclocking (Frequency, Voltage, Timing), Core Parking, and Simultaneous Multithreading utilities.
- In a span of 6 months, delivered ~70 multi-platform Windows SDK APIs. Further, established & documented >100 unit test cases & a detailed test plan for Ryzen Master GUI/CLI tool validation.

Engineering Intern

Jan 2017 - Mar 2017

Alstom, Bangalore, India

- Developed an end-to-end PySpark data pre-processing pipeline which comprises of Data Cleansing, Data Transformation, Statistical Analysis, Feature Selection, and Projection using Kernel PCA & t-SNE.
- Built Multivariate Regression & Autoregressive Integrated Moving Average-based Forecast Models for Predictive Analytics on Alstom EMEA employee compensation data.

TECHNICAL SKILLS

- **Languages:** Python, Go, C/C++, MySQL
- **Libraries:** PyTorch, NumPy, Transformers, Scikit-learn, Numba, OpenCV, Pandas, Flask, Apache Spark
- **Tools:** Git, Docker, Kubernetes, CMake, Postman, Unicorn, L^AT_EX, Jira, IBM LSF HPC Batch System

PROJECTS

- Exploiting Point-level Correspondences for Unsupervised 3D Point Cloud Understanding.
- 3D Pose and Shape Estimation with Stitched Puppet Model & Max Product Belief Propagation.
- Open-domain Question Answering over Knowledge Graphs & Text Passages with Memory Networks.
- Real-time Event-driven Multi-lane Vehicle Detection & Counting with YOLO.
- Multi-stage Informational Retrieval & Ranking System using Pretrained Language Models & BM25 Plus.

SEMINARS

- Hybrid Machine Learning Seminar on 'Learning like Humans with Deep Symbolic Networks', Universität des Saarlandes, Germany. Nov 2020 - Feb 2021.
- Research Poster on 'Advanced Cryptographic Standards & Security', Computer Society of India. April 2017.
- Seminar on 'High Performance Quantum Computing' at Cambridge Inst. of Tech., India. Mar 17 - May 2017.

ACHIEVEMENTS

- Merit certificate for top 5% of the graduating class of Bachelors in Computer Science & Engineering. Total number of graduating students: 106.
- Recommended by the Director of Technology & Software Engineering at AMD Research & Development for my technical expertise and agile adaptability skills.