AKSHAY JOSHI

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EDUCATION

ETH Zurich, Zurich, Switzerland   Feb 2022 - Present
Master of Science Research Thesis   GPA: In Progress
Research Area: Vision & Language, Visual Reasoning   *Advisor: Prof. Dr. Mrinmaya Sachan*

University of Saarland, Saarbruecken, Germany   Oct 2019 - Present
Master of Science in Data Science & Artificial Intelligence   GPA: 1.9/5.0
Research Area: Natural Language Understanding   *Advisor: Prof. Dr. Josef van Genabith*

Visvesvaraya Technological University, Karnataka, India   Aug 2013 - Jun 2017
Bachelor of Engineering in Computer Science & Engineering   GPA: 8.03/10
Research Area: Distributed Computing, Security   *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.

EXPERIENCES

Google Research   Feb 2022 - Present
Joint Research Thesis, Zurich, CH   *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.

German Research Center for Artificial Intelligence   Feb 2022 - Present
Joint Research Thesis, Saarbruecken, DE   *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.

German Research Center for Artificial Intelligence   Nov 2020 - Present
Deep Learning Student Researcher, Saarbruecken, DE   *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.

Saarland University Artificial Intelligence Group   Oct 2020 - Mar 2021
Graduate Teaching Assistant, Saarbruecken, DE   *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.

- Performed 2 iterations of development of a reference architecture & corresponding architectural design documents for a cloud-powered Conversational Question Answering Smart Digital Assistant in ~4 months.

AMD Research & Development   Aug 2018 - Sep 2019

Software Engineer, Bangalore, IN
- 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.

AMD Research & Development   Feb 2018 - Aug 2018

Software Engineering Intern, Bangalore, IN
- 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.

Alstom   Jan 2017 - Mar 2017

Engineering Intern, Bangalore, IN
- 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, Gunicorn, LATEX, 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 for Adversarial Situation Tracking.
- Highly Scalable, Resilient, and Secure Distributed Microservices Mesh to deploy the Multimodal Diagram Understanding Transformer model & 1 Million sample Pretraining Dataset using Docker, Kubernetes, & NGINX.
- 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 Mr. Satishkumar Narayanaswamy - Director of Technology & Software Engineering at AMD Research & Development for my technical expertise and agile adaptability skills.