KESHAV BHARADWAJ VAIDYANATHAN

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WORK EXPERIENCE

***Data Science Co-op,* Abiomed Inc (Johnson & Johnson), MA, USA** **Feb' 23 – Sept' 23**

- Developed machine learning models to predict cardiac output in patients receiving mechanical circulatory support, utilizing in vivo high-frequency time-series device data obtained from pre-clinical and clinical experiments, achieving a 5.2% reduction in percentage error.
- Conducted research and implemented a Domain-Adversarial Neural Network (DANN) to forecast aortic pressure in different patient cohorts, leveraging computer simulations to generate high-volume data.
- Analyzed and fine-tuned the predicted probability values generated by a Deep Neural Network (DNN) model for predicting right heart failures to enhance the model's Brier skill score.

***Machine Learning Engineer,* Mad Street Den, Chennai, India** **Dec' 20 – Jul' 21**

- Developed and implemented machine learning models with PyTorch to generate tags for an Elastic search-driven recommendation system.
- Constructed indexing and search scripts, leveraging the generated tags, and fine-tuned the scoring function for improved optimization.
- Designed a Convolutional Neural Network (CNN) for vision-based tasks of identifying handwritten text and tables within images.
- Developed a language-based Support Vector Machine (SVM) classifier to distinguish between different question subjects and to categorize questions into either multiple-choice or other question types.
- Designed and implemented data processing pipelines for client data and tag storage across Redshift, S3, Dynamo, and Redis databases and optimized the pipeline by eliminating redundant operations and fine-tuning it, resulting in a 15% reduction in response time.

RESEARCH AND TEACHING EXPERIENCE

***Graduate Research Assistant,* SILICON SYNAPSE LAB, Northeastern University, MA, USA** **Sep' 23 – Dec'23**

- Enhancing COBRA (Crater Observing Bio-inspired Rolling Articulator) by incorporating deep learning methods for object detection (YOLO) and semantic segmentation (Autoencoder) to improve its autonomy during lunar exploration. Supervised by Prof. Alireza Ramezani
- Working to deploy vision models to edge devices by utilizing network quantization and hardware-specific optimizations using OpenVINO and TensorRT with CUDA support for NVIDIA Jetson Orin

***Graduate Teaching Assistant,* Northeastern University, MA, USA** **May 22 – Dec' 22**

- Revised the lab manual through the adaptation of experiments to support the new RISC-V architecture and System Verilog
- Developed a computer architecture featuring an ALU, Instruction Decoder, and Memory, tailored for the RISC-V reduced instruction set.
- Assisted in debugging Verilog code using Xilinx Vivado. Monitored and supported students in lab sessions

TECHNICAL SKILLS

- Programming - Python, C++, R, SQL, Shell scripting, HTML, Latex, Verilog, system Verilog
- Software & Tools - AWS, Postgres, MongoDB, Docker, Elastic Search, SQLite, Postman, Git, OpenVINO, TensorRT, Vivado
- Packages - NumPy, Pandas, Flask, Tkinter, PyTorch, PyTorch-lightning, OpenCV, Keras, SciKit, NLTK, Dash, OpenGL

PATENTS (CERTIFICATE LINKS)

***Q-CerGen* (Quick Certificate Generator), Indian Copyright, IN 6797/2021-CO/SW** **Mar' 21**

- Devised a novel application to generate a substantial number of E-certificates quickly, providing an Excel file and certificate template.
- 3000+ certificates generated for national conferences, and other events. Developed code using OpenCV and designed an innovative user interface using Tkinter, and Python.
- Created Q-CerGen website using Flask and also created 3D E-trophies for participants using Brython and webGL.

***ADAM* (Automatic Disassemble and Assemble Machine), Capstone Undergrad Project** **Aug' 19 – Jun' 20**

- A significant contributor to the brainstorming, design, and development of a robotic pick-and-place arm prototype capable of disassembling a pattern constructed from basic blocks or units and reassembling it in a different location.
- Developed code for object recognition as well as pattern mapping utilizing the SIFT algorithm to map various blocks forming a given pattern dynamically and designed a 3D GUI for customizing patterns using OpenGL, and Python.

PROJECTS

***SegMask Frustum-PointPillars for 3D Object Detection,* Advanced Computer Vision, Northeastern University** **Sept' 22 - Dec' 22**

- Modified the existing Frustum-PointPillars architecture which uses images and point-cloud data (sensor fusion camera and LiDAR) by replacing the Gaussian mask with a segmentation mask and achieved a mAP score of 78.01 for cars class in the KITTI-Hard dataset.
- Established a real-time detection by adding a YOLOv7 2D detection layer instead of using KITTI ground truths.

***Question Answering System,* Natural Language Processing, Northeastern University** **Jan' 22 - Apr'22**

- Obtained a 63.5% accuracy and 66.7 F1-score with the baseline Seq2seq LSTM model on SQuAD2.0, and a 77.3% accuracy with Distilled BERT, achieving an 85.4 F1-score for question-answering tasks.

***Visual Question Answering,* Deep Learning, Northeastern University** **Jan' 22 - Apr' 22**

- Achieved 57% accuracy with the baseline LSTM Question + norm image model with a ResNet18 image embedding and 70.68% accuracy with the transformer-based LXMERT model for visual question answering on the VQA dataset.

EDUCATION

***Master of Science in Computer Engineering,* Northeastern University, Boston, MA | GPA - 3.879** **Dec' 23**

Specialization in Computer Vision, Machine Learning and Algorithms

- Coursework - Machine Learning, Deep Learning, Natural Language Processing, DBMS, Advanced Computer Vision, Assistive Robotics.

***Bachelor of Engineering in Electronics and Communication Engineering,* VTU, Bangalore, India | GPA-8.43/10** **Aug' 22**

- Leader of technical team Falcon, responsible for conducting and planning technical project expos. Organized and conducted technical seminars, national conferences, and technical workshops.