KUNAL KOTKAR

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EDUCATION

Masters in Computer Science, JOHNS HOPKINS UNIVERSITY, GPA - 3.84/4 May 2024(Expected)

Bachelors in Computer Engineering, UNIVERSITY OF MUMBAI, GPA - 9.6/10 July 2022

Relevant Courses: Computer Vision, Object Oriented Software Engineering, Data Structures (C++), Advanced Algorithms, Machine Learning, Cloud Computing, Software System Design, Testing and Debugging, Natural Language Processing, Large Language Models

TECHNICAL SKILLS

- **Programming Languages** – Python (6 years), Java (4 years) , C#(2 years), C/C++, JavaScript, HTML/CSS, Kotlin, SQL
- **Frameworks and Libraries** – OpenCV, PyTorch, Scikit-learn, Pandas, NumPy, Matplotlib, TQDM, TensorFlow, NNI, Selenium, Bootstrap, ReactJS, Angular, NodeJs, Flask, HuggingFace, PyDicom
- **Software Tools** – Docker, MicroDICOM Viewer, CVAT, VSCode, GPUs, MATLAB, Git, AWS (EC2, S3), Unity, MongoDB, MS Excel, Firebase

PROFESSIONAL EXPERIENCE

Computer Vision Engineer | HEPIUS INNOVATION LAB, BALTIMORE Jan 2023 – Present

- Generated and managed a dataset from DICOM files, enabling the deployment of deep learning models (Yolov8, DETR, SSD) for tasks such as injury detection with detection accuracy as high as **99.5%** and detection up to **58 frames per second**.
- Developed and trained state-of-the-art models (SAM, TransUNet, DeepLabv3) for automated segmentation of anatomical structures within the spinal cord, gaining a mean IOU of **82%** for the spinal cord anatomy.
- Engineered a Docker and AWS cloud environment facilitating medical professionals' use of the Computer Vision Annotation Tool (CVAT) for accurate ground truth generation.

Machine Learning Engineer | KNOWLEDGE SOLUTIONS INDIA, PUNE May 2020 – June 2020

- Designed and executed **Regression**, **Random Forest Classifier**, and **K-Means Clustering** (5 clusters), on proprietary datasets to drive data-driven decision-making on a movie recommendation task.
- Implemented an advanced Movie Recommendation System leveraging **K-Nearest Neighbors**, an unsupervised machine learning technique, to enhance user experience and drive engagement.

PROJECTS

LifeSavAR: An AR First Aid Guide | *Unity, C#, Mixed Reality Tooklit (MRTK)* | [GitHub]

- Designed an AR application for Microsoft HoloLens for emergency medical guidance, automating testing for real-time assistance.
- Integrated Vuforia and MRTK for overlay on a Torso phantom, enhancing the real-time assistance capability for non-medical users.

Predicting Ejection Fraction using Segmentation guided Video Vision Transformers | *Python, PyTorch, Computer Vision* | [Poster]

- Transitioned the EchoNet-Dynamic and integrated segmentation models with transformers, focusing on software testing to predict cardiac function with high accuracy.
- Accomplished a mAE of **5.81** in predicting Ejection Fraction and secured an AUC score of **91%**.

HopCourses - A Course Review Webpage for JHU Students | *MERN* | [Website]

- Developed a dedicated JHU course review platform using the **MERN stack**, integrating a sentiment analyzer for review insights.
- Ensured exclusive access to JHU affiliates through the integration of JHU SSO Login.

Twitter Sentiment Analysis Platform: Covid-19 Insights| *NodeJS, IBM Cloud*

- Developed a web platform leveraging **Node-Red** and **IBM Watson Services** to analyze sentiment and emotions in tweets on Covid-19 and lockdown from March '20 to Sept '20, offering a snapshot of public sentiment during the period.
- Developed a platform for real-time sentiment analysis, showcasing my ability to manage and implement automated testing solutions.

AWARDS

Joel Dean Excellence in Teaching Award | JOHNS HOPKINS UNIVERSITY April 2024

PUBLICATIONS

"Injury Localization and Anatomical Segmentation in Ultrasound Spinal Cord Images," [Publication in Progress]

- Presenting an ultrasound spinal cord dataset of **10,223 DICOM images**, benchmarking state-of-the-art object detection for injury localization and semantic segmentation models for anatomical labeling.
- Attained high-performance metrics in injury detection using Yolov8 with accuracies up to **99.5%** and excelled in segmentation of spinal cord anatomy in humans, achieving a Dice score of **84.66%**, demonstrating effective zero-shot generalization for clinical translation.

"Mime3D - A Patient Monitoring System," ACCAI 2022. Published in IEEE Xplore [paper link]

- Engineered a system integrating **IMU sensors** and the **ESP32S NodeMCU WiFi** module to transmit data through Arduino to a remote server; this was subsequently relayed to a web interface with a **3D human model**, mirroring real-time human motions within Unity.
- Successfully emulated limb movements of volunteers from **Bhabha Atomic Research Center** engaged in sports activities.

"Employee Attrition Using Machine Learning And Depression Analysis," ICICCS 2021. Published in IEEE Xplore [paper link]

- Employed the Goldberg Depression Questionnaire and harnessed a Random Forest Classifier algorithm on a custom dataset to predict employee attrition with **86%** accuracy.
- Designed a user-friendly **Flask-based website** for seamless visualization of the analysis results.