# Jack Jin

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## EDUCATION

**Massachusetts Institute of Technology** **Cambridge, MA**

*Bachelor of Science in Computer Science and Engineering (GPA: 4.5/5.0)* *Class of 2024*

Coursework: Intro to Machine Learning, Design and Analysis Algorithms, Software Construction, System Engineering, Computer Graphics, Computer Vision, Intro to Algorithms, Computer Security, Statistical Thinking and Data Analysis

## EXPERIENCE

**Massachusetts Institute of Technology UROP** **Cambridge, MA**

*Research Fellow* *June 2023 - Jan. 2024*

Collaborated with an MIT researcher to develop a space-weather forecasting model from the ground up, using AI-driven tools. Achieved an 88% accuracy after thorough fine-tuning and dynamic data splitting.

- Scoped out existing models and research to deepen understanding of machine learning applications.
- Meticulously analyzed and cleaned a naturally messy dataset to make it training ready.
- Achieved base accuracy of 71% with diverse data sampling techniques and hyper-tuned space weather parameters.
- Rigorously tested model to verify reliability and boosted performance to 88% validation accuracy using fine-tuning and smart data splitting.

## PROJECTS

**Disaster Tweets Classifier** **Nov. 2024 - Dec. 2024**

Participated in the "NLP with Disaster Tweets - EDA, Cleaning and BERT" Kaggle competition, achieving an impressive 81.92% accuracy model after fine-tuning.

- Thoroughly cleaned dataset of tweets and prepped data using text-hammer and WordCloud.
- Used an open-sourced embedding model to initially obtain a baseline accuracy of 60%.
- Observed areas of improvement in the model such as adding additional Dense and dropout layers and rigorously fine-tuned the hyperparameters of the model while preventing overfitting.

**Image Classifier** **Aug. 2024 - Sep. 2024**

Created an image classifier for the CIFAR10 dataset using convolutional neural network and other cutting edge optimization techniques to achieve 79.51% accuracy.

- Initialized and prepped CIFAR10 dataset and created DataLoaders using PyTorch.
- Efficiently analyze spatial information of the dataset using a CNN. Achieved baseline accuracy of 69% using the ReLU activation function, cross-entropy loss function and Adam optimizer.
- Strengthened model by adding more convolution layers, using batch normalization and introducing dropout.

**Python-based Voxel Engine** **Nov. 2023 - Dec. 2023**

Engineered a voxel engine using ModernGL, resulting in realistic landscape generation during run-time. Allowed for real-time and continuous updates to landscape by optimizing resource utilization by 10x.

- Grouped individually rendered voxels into chunk objects to allow for more efficient world generation.
- Utilized GLM simplex noise algorithm to generate realistic world landscapes and applied MIPmap textures to voxels to improve visuals.
- Implemented face-culling of hidden voxel faces to drastically improve computational efficiency by reducing renderable faces.

**Realistic Physics Simulator** **Sep. 2023 - Dec. 2023**

Developed a realistic physics simulator using OpenGL and GLOO to model systems such as pendulums and water particle dynamics with high fidelity.

- Leveraged principles of mechanics and fluid dynamics to ensure accurate representation of physical interactions.
- Implemented advanced algorithms such as Smoothed Particle Hydrodynamics and efficient spatial partitioning techniques to enhance the computational and rendering performance.

## SKILLS

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| **Software** | Python, C++, TypeScript, Java, HTML/CSS, R, SQL, Assembly, ModernGL, Algorithms, Data Structures, Data Modelling, MongoDB, Data Analysis |
| **ML** | Pytorch, Deep Learning, Reinforcement Learning, Pre-training/Fine-tuning, Natural Language Models, Retrieval Augmented Generation, Embedding Models, LangChain, Tensorflow, Keras, Transformers |
| **Math** | Linear Algebra, Multivariable Calculus**,** Differential Equations, Statistics, Data Science, Regression |