Vivek **Khandelwal**

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Education

Indian Institute of Science — *Bangalore, India*

M.Tech in Computer Science and Engineering — *Aug. 2019 - July 2021*

- CGPA : 8.1/10
- Courses: Computer Architecture, Compiler Design, Theory and Practice of Computer Systems Security, Deep Learning for Natural Language Processing, Machine Learning, Practical Data Science, Linear Algebra and Probability, Design and Analysis of Algorithms, Cryptography.

Madhav Institute of Technology & Science — *Gwalior(M.P.), India*

B.E. in Computer Science and Engineering — *Aug. 2015 - July 2019*

- CGPA : 7.77/10

Projects

Automated Tool for Efficient GPU Code Generation using MLIR — *July 2020 - Present*

M.Tech. Project | Under the guidance of Prof. Uday Kumar Reddy B.

- Building a tool for automatic code generation on GPUs targeting Tensor Cores using MLIR. The basic operation targeted is matmul but we plan to extend it to work with other operations fused with matmul such as bias addition, relu, softmax etc.
- This tool will be able to generate efficient code for any GPU architecture and will eliminate the requirement of manually writing GPU code. The aim is to accelerate deep learning/natural language processing models such as BERT, GPT etc.

Loop Interchange Pass in MLIR — *May 2020 - June 2020*

- Implemented a loop interchange pass on Affine Dialect in MLIR driven by a cost model that takes in account spatial and temporal locality - both self and group and parallelism(for multi cores).
- The pass finds out the optimal loop permutation which optimizes the code for both spatial & temporal locality. It also tries to bring the parallel loops to outermost position to reduce the frequency of synchronization and maintains the balance between locality and parallelism.

Tool to Support Nested Functions in C — *Mar. 2020 - Apr. 2020*

- Built a tool to perform source to source transformation in Clang(LLVM's C/C++ compiler front end) to support nested functions(closures). The tool was built using Clang LibTooling and ASTMatchers.
- This tool enables a programmer to write a C program with nested functions emulated using labeled blocks by taking it as an input and outputting a transformed valid C program.

Learning in Sparse Reward Environments — *Mar. 2020 - May 2020*

- The project focused on training an agent(robot) to learn effectively in sparse reward environments(only binary reward). Experience Replay technique along with Demonstrations was used in this project to train an agent.
- We achieved more than 95% test success rate on OpenAI Gym environments with non-dynamic goals and 85% success rate in case of dynamic goals environments.

Exploiting Vulnerability in LogonTracer — *Sep. 2019 - Nov. 2019*

- LogonTracer is a tool to investigate malicious Windows logon by analyzing Windows Active Directory event logs. Two open vulnerabilities were exploited in this project.
- We performed OS-command Injection Attack and Arbitrary Code Injection Attack. Apart from this, we discovered two more vulnerabilities which were Cross-Site Scripting Attack and XML External Entity Injection Attack.

Skills

Programming	C++, C, Python. Previously worked with HTML, CSS, MySQL
Technologies	MLIR, Clang, Linux, Git, Wordpress
Libraries	CUDA, Numpy, Keras, Pandas, Scikit-learn, Matplotlib, OpenAI Gym & Baselines

Achievements

2020 **Flipkart Grid,** Secured position in Top 150 out of 22.5K teams from Top 100 colleges of India

2019 **GATE,** All India Rank: 45(78.33 marks out of 100)