

INTERNATIONAL SYMPOSIUM ON GRIDS & CLOUDS 2021 (ISGC 2021)

HTIP COMPRESSION ALGORITHM

PRIMARY AUTHOR:

PROF. KALPITA WAGASKAR

CO-AUTHORS:

- Mr. YASH BITLA (SPEAKER)
- Mr. ARJUN CHAVAN
- Ms. MAITHILY ASHTANKAR



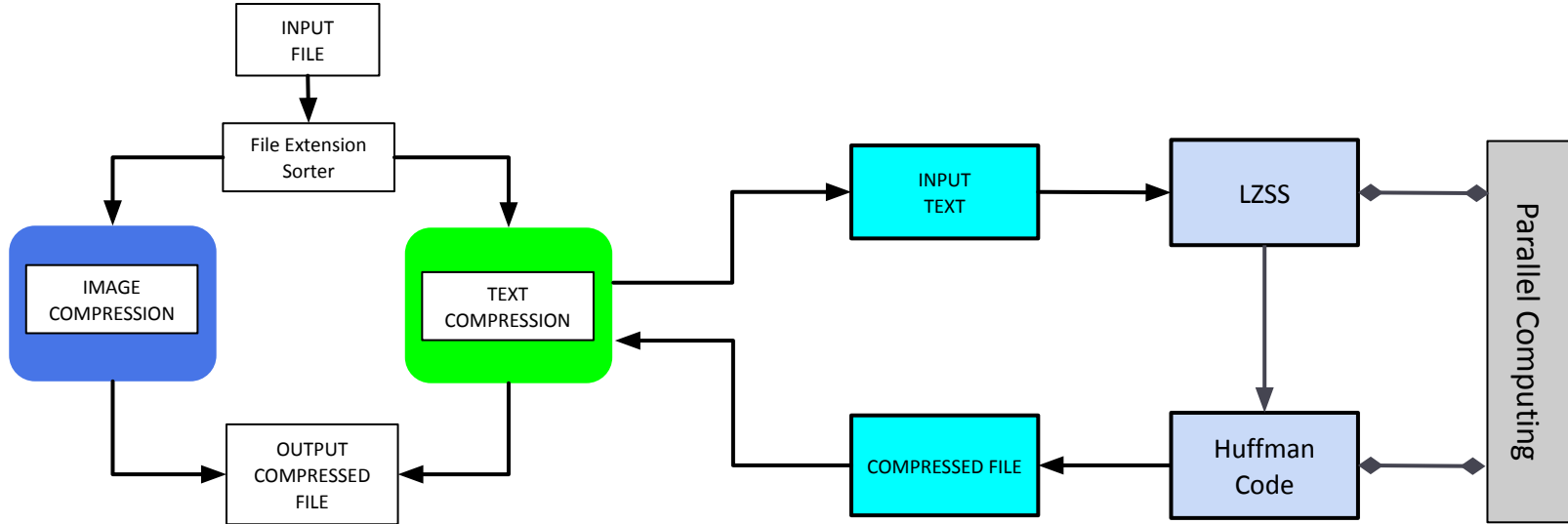
PROBLEM STATEMENT:

**“HYBRID TEXT AND IMAGE PARALLEL
COMPRESSION ALGORITHM (HTIP)”**

MODULES:

MODULE NAME	OBJECTIVE	OUTCOME
Text Compression Module 1	Parallel LZSS Compression	To compress the given input text file using LZSS to generate an intermediate file.
Text Compression Module 2	Parallel Huffman Compression	To further compress the intermediate file into the final compressed file using Huffman Compression.
Image Compression Module 1	Semantic Perception of Image (GRAD CAM)	To generate a map that highlights the semantically-salient regions so that they can be encoded at higher quality as compared to background regions
Image Compression Module 2	Hybrid Layered Image Compression	To generate a compressed image based on the semantic perception of the input image received from grad - cam

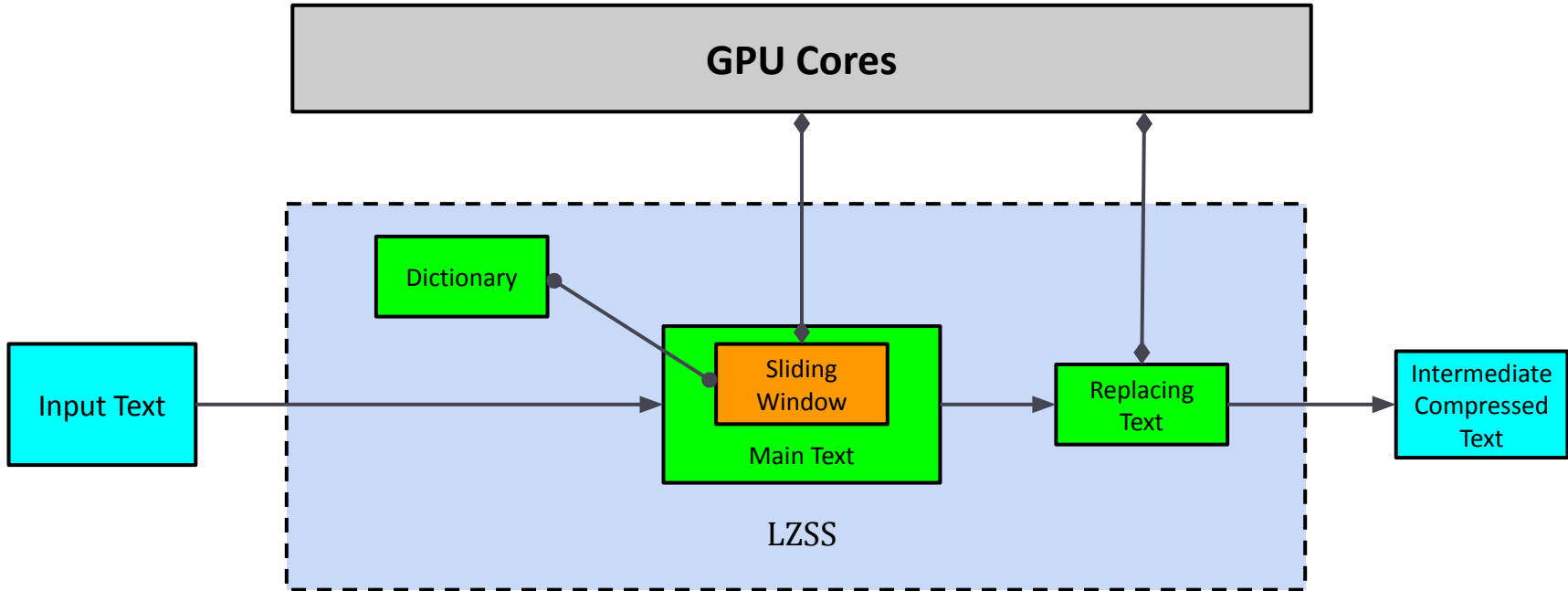
ARCHITECTURE:



INPUT SORTER

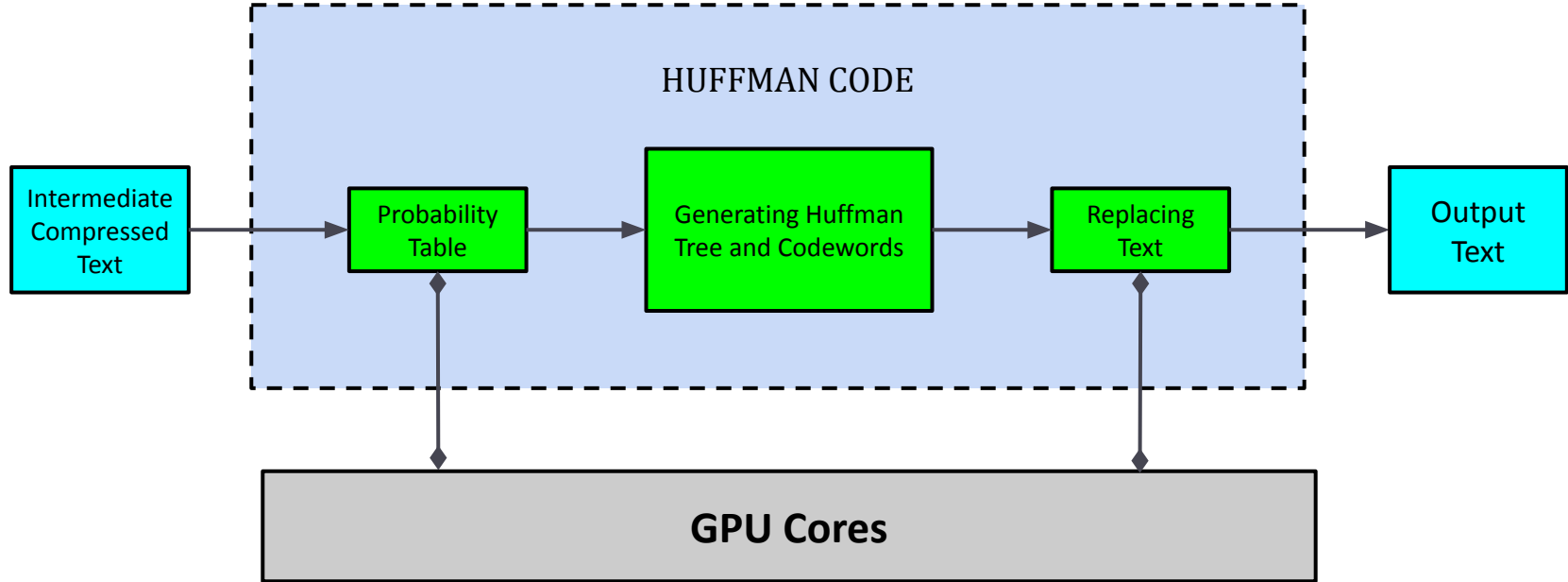
TEXT COMPRESSION

ARCHITECTURE:



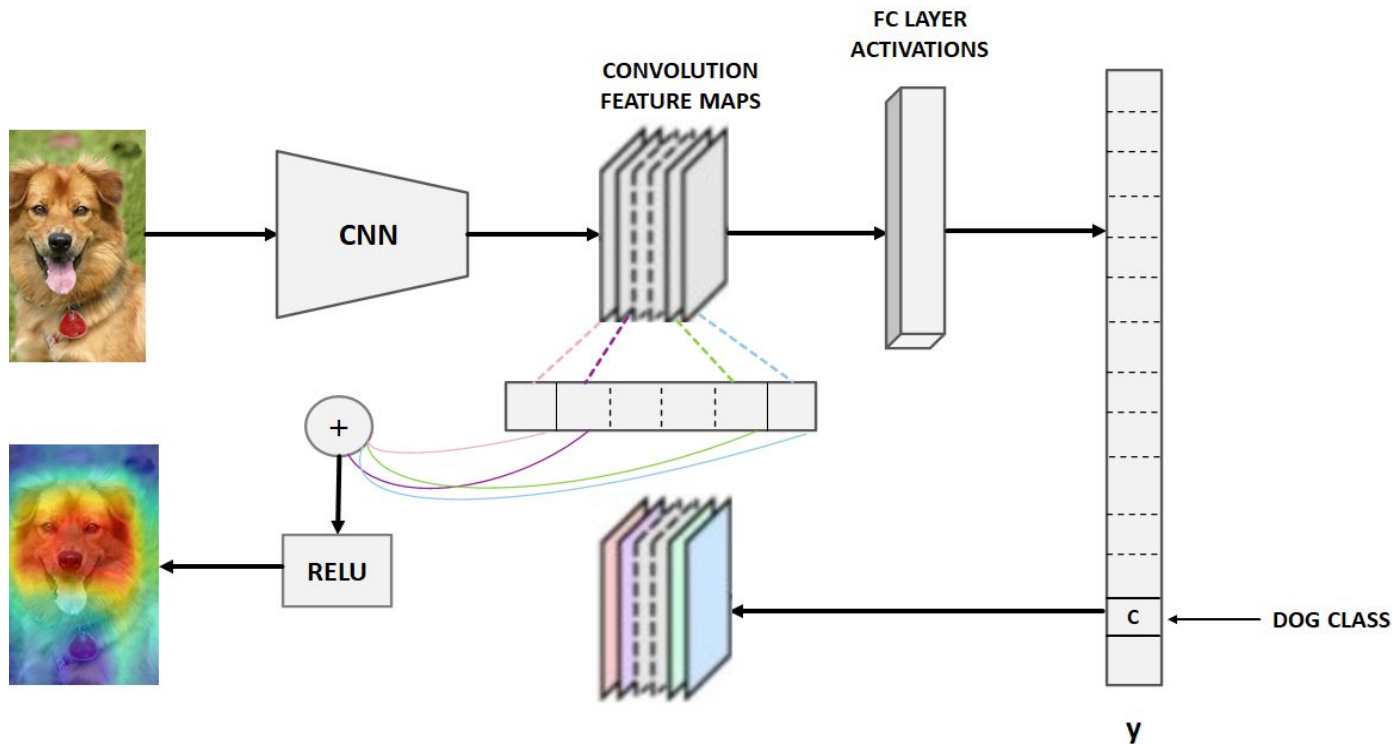
**COMPRESSION BY LZSS
(Text Module 1)**

ARCHITECTURE:



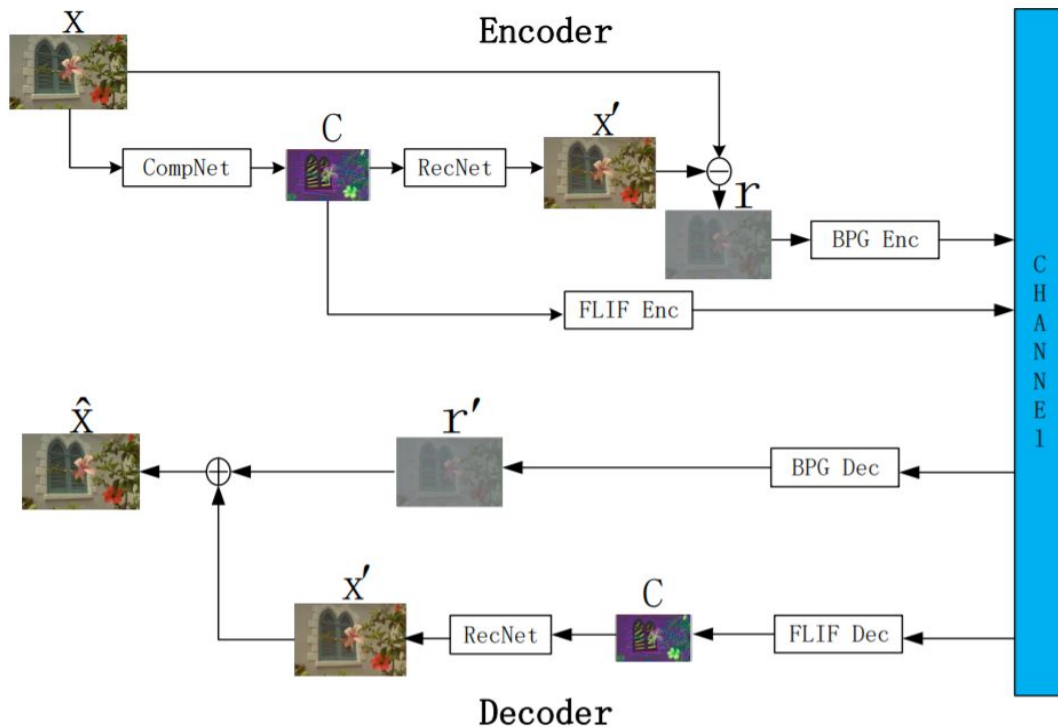
COMPRESSION BY HUFFMAN
(Text Module 2)

ARCHITECTURE:



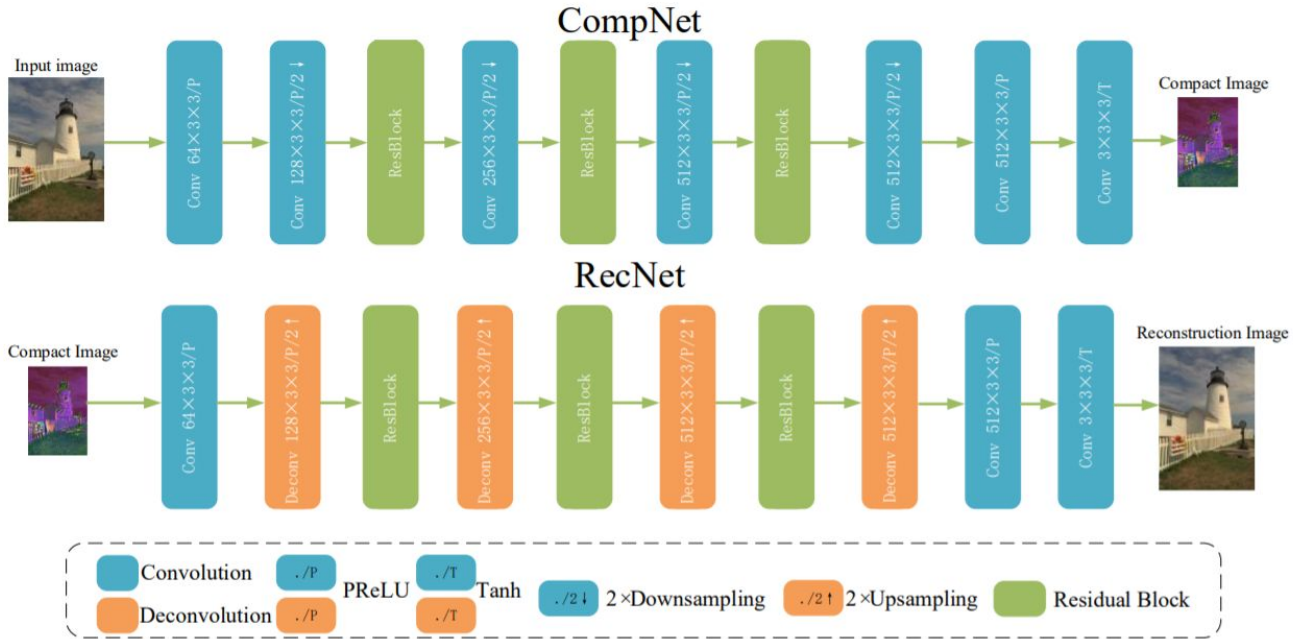
SEMANTIC PERCEPTION IMAGE COMPRESSION (GRAD CAM)
(Image Module 1)

ARCHITECTURE:



PROPOSED HYBRID IMAGE COMPRESSION NETWORK
(Image Module 2)

ARCHITECTURE:



STRUCTURE OF COMPNET AND RECNET

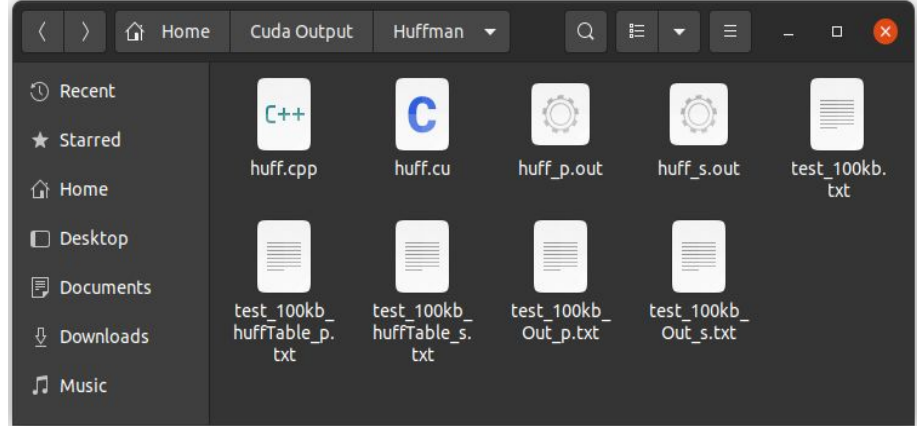
OUTPUT ANALYSIS:

TEXT FILE SIZE (kb)	COMPRESSED FILE SIZE (kb)
10	7.69
50	37.52
100	73.85

SERIAL IMPLEMENTATION OF HUFFMAN CODE

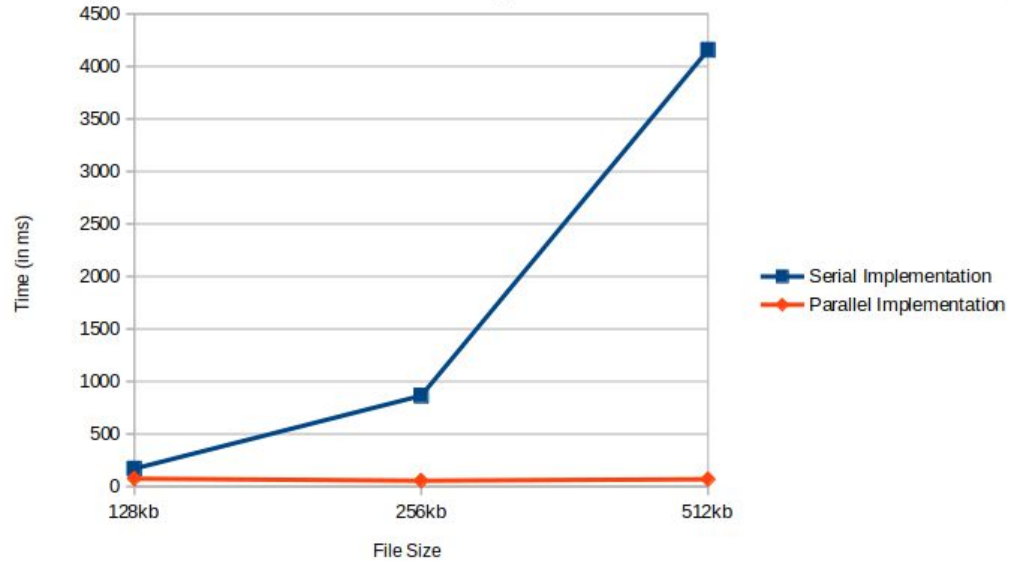
OUTPUT ANALYSIS:

```
red217@pavilion15cx: ~/Cuda Outp...
red217@pavilion15cx:~/Cuda Output/Huffman$ ./huff_s.out
Serial Huffman Compression
Enter File Size: 100kb
File Size: 100kb
Counting Time: 0.146013
Compression Ratio: 1.34101
red217@pavilion15cx:~/Cuda Output/Huffman$ ./huff_p.out
Parallel Huffman Compression
Enter File Size: 100kb
File Size: 100kb
Counting Time: 0.074729
Compression Ratio: 1.3406
red217@pavilion15cx:~/Cuda Output/Huffman$
```



PARALLEL IMPLEMENTATION OF HUFFMAN CODING

OUTPUT ANALYSIS:



File sizes	Serial Implementation	Parallel Implementation
128kb	170ms	75ms
256kb	865ms	55ms
512kb	4157ms	69ms

GRAPHICAL COMPARISON OF HUFFMAN CODING

OUTPUT ANALYSIS:



SEMANTIC PERCEPTION OF IMAGE - GRAD CAM

TECHNOLOGY STACK:

TENSORFLOW / PYTORCH

C / C++

PYTHON

COMPRESSION ALGORITHM

CUDA PROGRAMMING

CLOUD GPU

UBUNTU OS

PARALLEL PROCESSING





FUTURE SCOPE:

1. Compressing a scanned pdf file.
2. Compressing a formatted text file.
3. Approaching companies to identify the different data types used by them that can be compressed.

REFERENCES

- [1] Lawrence L. Larmore and Teresa M. Przytycka. "Constructing Huffman Trees in Parallel". Vol.24, No.6, pp.1163-1169, December 1995.
- [2] Sandeep G, Sunil Kumar B, Deepak D. "An Efficient Lossless Compression Using Double Huffman Minimum Variance Encoding Technique". 2015.
- [3] Yuan Jing. "The Combinational Application of LZSS and LZW Algorithms for Compression Based On Huffman". 2011
- [4] Adnan Özsoy, Martin Swamy and Arun Chauhan. "Pipelined Parallel LZSS for Streaming Data Compression on GPUs". 2012
- [5] Saravanan Chandran. "Enhancing the Efficiency of Huffman Coding using Lempel Ziv Coding For Image Compression". January 2013.
- [6] Haisheng Fu, Feng Liang, Bo Lei, Nai Bian, Qian Zhang, Mohammad Akbari, Jie Liang and Chengjie Tu. "Improved Hybrid Layered Image Compression Using Deep Learning and Traditional Codecs". July 16 2019.
- [7] Aaditya Prakash, Nick Moran, Solomon Garber, Antonella DiLillo and James Storer. "Semantic Perceptual Image Compression using Deep Convolution Networks". March 29 2017.
- [8] Vishakh Hegde and Sheema Usmani. "Parallel and Distributed Deep Learning."

**THANK
YOU**

