CS17B031
Cuda library report

CUDA-X is a collection of libraries, tools, and technologies that deliver dramatically higher performance—compared to CPU-only alternatives— across multiple application domains, from artificial intelligence (AI) to high performance computing (HPC).

NVIDIA libraries run everywhere from resource-constrained IoT devices, to self-driving cars, to the largest supercomputers on the planet. As a result, you get highly-optimized implementations of an ever-expanding set of algorithms. Whether you're building a new application or accelerating an existing application, NVIDIA libraries provide the easiest way to get started with GPU acceleration.

There are 6 types of libraries in CUDA:

- Math Libraries:
  - This libary is used for compute intensive application such as molecular dynamics, computational fluid dynamics, computational chemistry, medical imaging, and seismic exploration.
  - Among Math libraries it contains, FFT, BLAS (Lin Algebra), standard math library, rand number generator, solver, sparse, tensor, AmgX.

- Image and videp processing libraries:
  - It is used for image and video decoding, encoding, and processing that leverage CUDA and specialized hardware components of GPUs.
  - Jpeg decoding, image and signal processing function, video codec and optical flow sdk.

- Parallel Algorithms Library:
  - Thrust - GPU-accelerated library of C++ parallel algorithms and data structures.
  - GPU-accelerated libraries of highly efficient parallel algorithms for several operations in C++ and for use with graphs when studying relationships in natural sciences, logistics, travel planning, and more.

- Communication Librarys:
  - Performance-optimized multi-GPU and multi-node communication primitives.
  - It contains NVSHMEM, NCCL.

- Deep Learning:
  - GPU-accelerated libraries for Deep Learning applications that leverage CUDA and specialized hardware components of GPUs.
  - It contains cuDNN, TensorRT, jarvis, deepstream, dali.

- Partner Libraries:
  - OpenCV, FFMPEG, ArrayFire, Magma, IMSL Fortran Numerical Library, Gunrock, CHOLMOD, Triton Ocean SDK, CUVIlib.