

GXLD – GSI Extra Large Device

Description:

GXLD is a library which performs a KNN with L1 metric between records and queries.
The program gxld, run a test on the device, checks for radiation errors on the card and validate the output.
If an error is detected, the program alerts the user and repair it (by reloading the defected data from L4).
If the output is invalid, the program alerts the user.

Usage:

Extract with:
`tar xvf gxld.tar`

The extraction will open a folder named gxld.
Move to gxld folder and run.

Run with:
`./run <NUMBER_OF_QUERIES>`
`@NUMBER_OF_QUERIES` – number between 1 and 2250000.

In order to run gxld, the following command need to be executed:
`REF_INCREMENT=<REF_STRIDE> ./gxld_run -t=4 -f=192 -q=<NUM_OF_QUERIES> -r=32768 -b=256 -k=64 -g=32`
`NUM_OF_QUERIES / REF_STRIDE` should be around 1000 in order for the reference running time to be fast.
The script named run, will execute this command.

Timings:

Number of queries	Time in seconds
1000000	12.5
2000000	25

Screenshots:

Image of radiation error detected on the card:

```
TIME STAMP: 07/31/23 11:08:33.020245739 UTC
ARCT[0]: Radiation test failed - APU core = 0, soft error found at vmr 0
TIME STAMP: 07/31/23 11:08:33.020285489 UTC
ARCT[1]: Radiation test failed - APU core = 1, soft error found at vmr 0
ARCT[1]: Radiation test failed - APU core = 1, total errors found is 1
TIME STAMP: 07/31/23 11:08:33.020313460 UTC
ARCT[0]: Radiation test failed - APU core = 0, total errors found is 1
TIME STAMP: 07/31/23 11:08:33.021735674 UTC
ARCT[3]: Radiation test failed - APU core = 3, soft error found at vmr 0
TIME STAMP: 07/31/23 11:08:33.021812104 UTC
ARCT[3]: Radiation test failed - APU core = 3, total errors found is 1
TIME STAMP: 07/31/23 11:08:33.090277469 UTC
ARCK[2]: After task: 0x190175c (0x2d00400, 0x0) ret = 0
```

Output example:

```
***** ENV ARGS *****

APU_BOARD = dev-3b00
SEED = 1690792033
REF_INCREMENT = 10
*****

***** ARGS *****
num_features = 192
num_queries = 10000
num_records = 32768
num_queries_per_batch = 256
k = 64
g = 32
num_threads = 4
*****

Num Contexts = 3
Name = dev-3b00
Memory Size = 13G
Num Apucs = 4
Constantly mapped memory = 0.206054G
Dynamically mapped memory = 13.7451G
Performing searches ...
Searches complete: Wall clock time passed (ms) = 150.148
Calculating reference (checking queries in increments of 10) ...
Checking results for apuc 0 ...
Finished checking results for apuc 0.
Checking results for apuc 1 ...
Finished checking results for apuc 1.
Checking results for apuc 2 ...
Finished checking results for apuc 2.
Checking results for apuc 3 ...
Finished checking results for apuc 3.
Test PASSED
Done
```