BRAIN TUMOUR DETECTION USING DPC++ FROM MRI IMAGES (SYCL)

Team Name – DELTA-FORCE

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Problem Statement

Problem Statement: **Brain Tumor Detection from MRI images**

→Develop a system to accurately detect brain tumors in medical images, such as MRI scans.

→ The system should preprocess the images, train a deep learning model on labeled data, and provide inference on new images to classify them as tumor-positive or tumor-negative.

→The system's performance should be evaluated using metrics like accuracy, precision, recall, and F1 score. Additionally, benchmarking measures such as latency and throughput should be analyzed to assess the system's efficiency and compare different implementations.

→The goal is to provide a reliable tool for medical professionals to aid in the diagnosis and treatment of brain tumors.

Architecture – Impact of oneAPI AI Toolkit & its Libraries /SYCL (How oneAPI /SYCL helped you?)

The inclusion of the oneAPI base Toolkit and its SYCL library in the architecture of the provided code has several impacts:

→Hardware Portability: Allows seamless utilization of diverse hardware platforms.

→Parallel Processing: Enables efficient parallel execution for improved performance.

→Deep Learning Integration: Integrates with TensorFlow for leveraging deep learning capabilities.

→Performance Optimization: Optimizes performance across different hardware architectures.

→Task-Based Execution: Efficient resource management through SYCL's task-based model.
→Enhanced Performance and Scalability

Core components of oneAPI AI Toolkit & its Libraries /SYCL used in the project

→**oneAPI DPC++ Compiler**: Used to compile and optimize the SYCL code for execution on different hardware accelerators.

→**SYCL**: Provides a single-source programming model for heterogeneous computing, allowing for efficient utilization of accelerators.

→**TensorFlow**: An AI framework used for loading and running the trained brain tumor detection model.

→**OpenCV**: Used for image processing tasks, such as loading and resizing brain images.

→**Filesystem Library**: Used to traverse the directory and fetch the list of brain image files.

→**Standard C++ Libraries:** Used for general-purpose programming tasks, such as random number generation, benchmarking, and memory management.

Demo Video/Live Demo
Please elaborate oneAPI AI Toolkit & its Libraries /SYCL usage

https://drive.google.com/drive/folders/1xBlcs6gEd2Q-Th7PGXBeObSD8IiMB7_b?usp=sharing

GitHub Link (Codes should be public and available after hackathon also)

https://github.com/Dineshjnld/intel-oneAPI

Results Summary (focus on unique aspects of oneAPI AI Toolkit & its Libraries /SYCL that you have used)

→oneAPI Base Toolkit and SYCL components facilitated hardware acceleration and TensorFlow integration, resulting in improved brain tumor detection performance compared to Python alone.

- → By leveraging SYCL's parallel programming model, the project achieved efficient utilization of hardware resources and enhanced computational performance.
- → The code portability provided by oneAPI allowed seamless execution on different platforms and architectures.
- → The integration of oneAPI Base Toolkit with TensorFlow enabled seamless utilization of deep learning models for accurate tumor detection.
- → The utilization of DPC++ in the project resulted in faster inference times and improved overall throughput compared to Python-based implementations.

H2S HACK2SKILL

intel

oneAPI

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THANK YOU