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oneAPI
<HACK>ATHON

BUILD SOLUTIONS TO
UNLOCK THE POTENTIAL OF
HETEROGENEOUS COMPUTING

<Xion> <oneAPI>

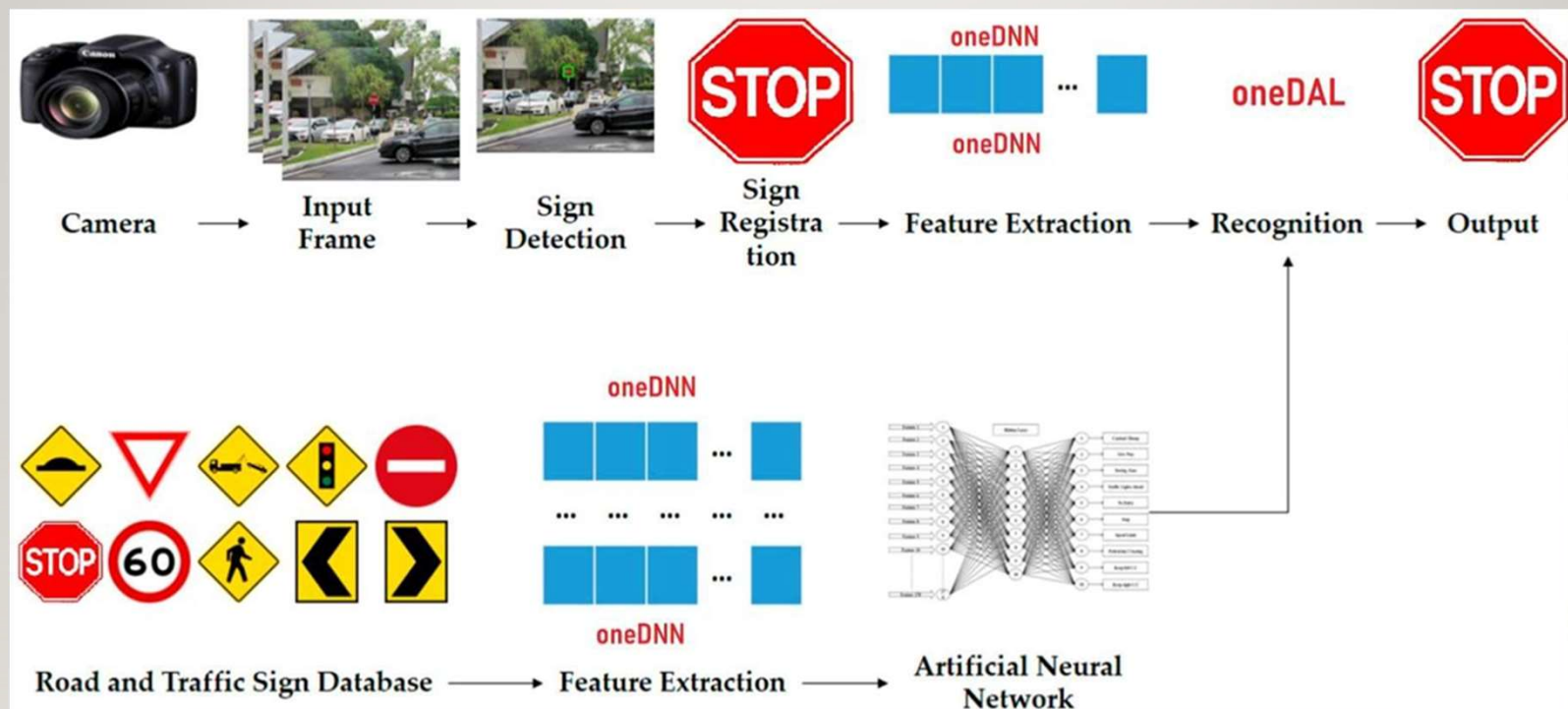
Team Name : Team XION

Team Members: Sarthak Joshi, Rachit Shah, Yashvi Chandola, Abhishek Maurya

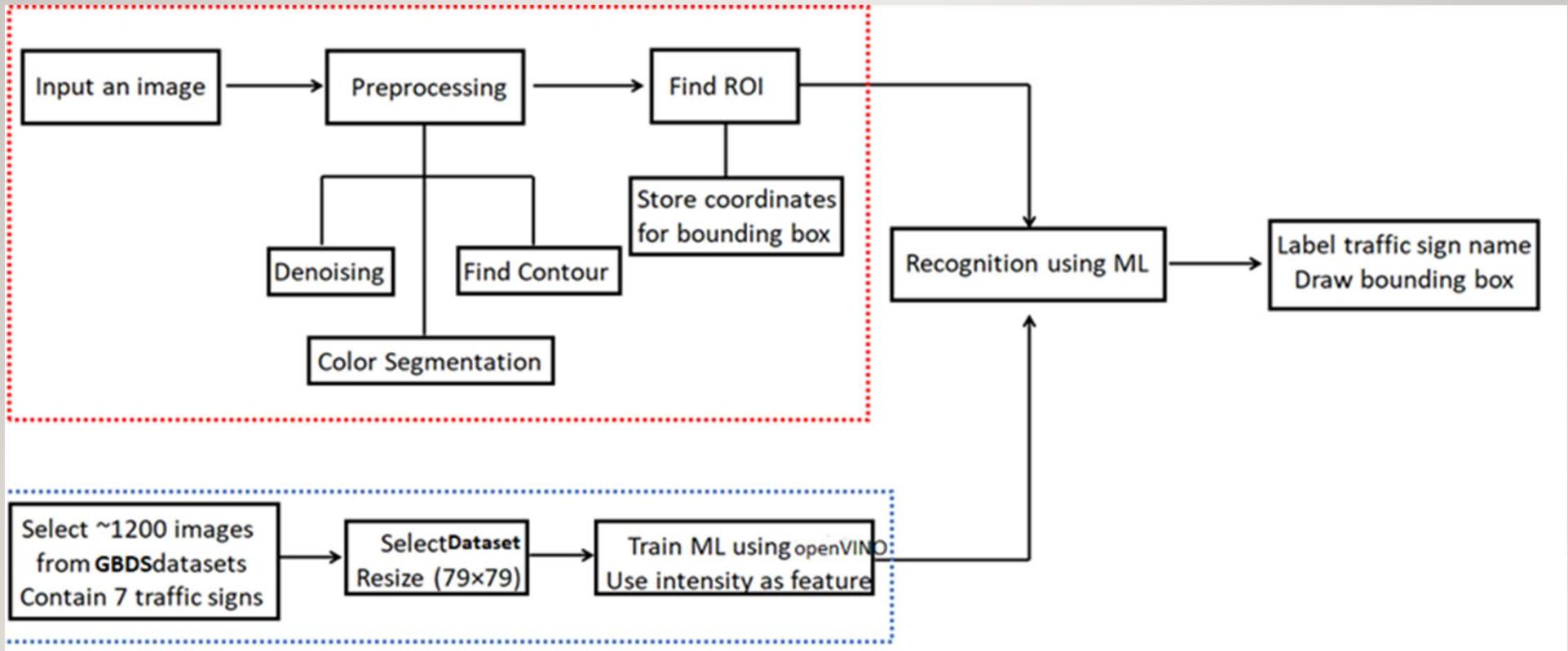
Problem Statement

- India has a diverse range of road signs, with an estimated total of over **100,000 road signs across the country**.
- A dataset for road sign detection in India may contain thousands of annotated images and videos capturing different types of road signs.
- This includes **signs in multiple languages, such as English, Hindi, and regional languages**, reflecting the country's linguistic diversity.
- The dataset should cover **various weather conditions**, including clear skies, rain, fog, and low light situations, to account for different visibility scenarios.
- **So, there is the solution Xion (Extreme Identification Of Navigation).**

Architecture – Impact of oneAPI/SYCL



DATAFLOW DIAGRAM



Core components of oneAPI used in the project

Performance Optimization: **oneDAL** is designed to take advantage of parallel computing architectures, such as CPUs and GPUs, to accelerate data analytics tasks. By utilizing parallel algorithms and optimizations, it can significantly speed up the processing of large-scale road sign datasets, enabling faster and more efficient road sign detection.

Data Preprocessing: oneDAL provides a set of data preprocessing algorithms and functions that can be utilized to clean, transform, and prepare the road sign data for analysis. This includes tasks such as data normalization, feature scaling, and missing value handling, ensuring that the data is in a suitable format for road sign detection algorithms.

Integration with OpenVINO: oneDAL seamlessly integrates with OpenVINO, allowing for the deployment and optimization of machine learning models developed using oneDAL on different hardware platforms supported by OpenVINO. This integration ensures that road sign detection models trained using oneDAL can be efficiently deployed in real-time applications, such as autonomous vehicles, using OpenVINO's inference capabilities.

Demo Video/Live Demo

Youtube Link to Demo Video:-

<https://www.youtube.com/watch?v=ZCrOj5g974A&feature=youtu.be>

- GitHub Link (Codes should be public and available after the hackathon also)
- GitHub link:- [Craniace/intel-oneAPI: This repository is for participants of INTEL ONE API 2023 Hackathon \(github.com\)](#)
- GitHub link:- [Craniace/Team_Xion \(github.com\)](#)

Results Summary

- 1. Hardware Acceleration:** By utilizing oneAPI, the road sign detection project was able to take advantage of hardware acceleration capabilities offered by different devices. For example, GPUs were used to accelerate the training and inference processes, enabling faster and more efficient road sign detection algorithms.
- 2. Data Parallelism:** oneAPI's data parallelism capabilities allowed for the efficient processing of large datasets in parallel, enhancing the performance of road sign detection algorithms. By leveraging parallel execution across multiple compute units, the project achieved significant speedup, reducing the processing time required for road sign detection tasks.
- 3. Optimization Tools:** oneAPI provides a range of optimization tools that assist in fine-tuning the performance of road sign detection algorithms. These tools include profilers and performance analyzers that helped identify bottlenecks and optimize critical sections of the code, resulting in improved overall performance and resource utilization.
- 4. Deployment Flexibility:** With oneAPI, the road sign detection project was able to deploy the trained models across different platforms seamlessly. The project leveraged the deployment capabilities of oneAPI frameworks, such as OpenVINO, to deploy the road sign detection models on edge devices, enabling real-time inference and integration with autonomous vehicles or other applications.
- 5. Scalability and Future-Proofing:** oneAPI's scalable design ensured that the road sign detection project could easily scale and adapt to evolving hardware architectures and requirements. The project was future-proofed by leveraging the oneAPI ecosystem, which provides access to a growing collection of optimized libraries, frameworks, and tools, enabling continuous improvements and updates to the road sign detection solution.

1
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THANK YOU