Basic Details of the Team and Problem Statement

Ministry/Organization Name/Student Innovation:

Ministry of coal

PS Code:

1320

Problem Statement Title:

In-cab smart guidance and support system for Dragline Operator

Team Name:

Brute Force

Team Leader Name:

Mohamed Mafaz

Institute Code (AISHE):

U-0445

Institute Name:

B.S. Abdur Rahman Crescent Institute of Science & Technology

Theme Name:

Smart Vehicles

Idea/Approach Details

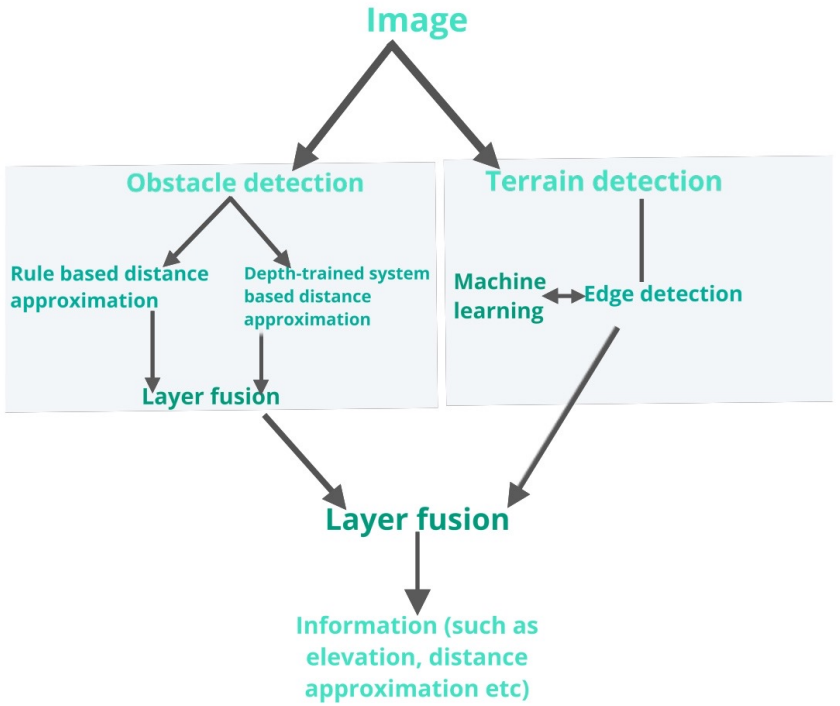
Describe your idea/Solution/Prototype here:

An approach to leverage Computer vision in the field of smart guidance and support system.

Utilising multiple cameras to perceive the surroundings, this approach will distribute the information to multiple layers that will work on algorithms-

- Rule based distance approximation (for far - middle range obstacles)
- Depth-trained system based distance approximation (for closer obstacles)
- Edge detection (To detect uneven terrain)

Specialised rules are developed to correlate depth cues with real-world distances, enabling informed decision-making for obstacle detection, safe path following, interaction with the environment and alerts generation for uneven terrain



Describe your Technology stack here:

Python Programming language will be used as most of the machine learning libraries exist in python

Database management:

- Pandas / SQL

Major Libraries/Components :

- YOLO
- MiDaS
- Open cv
- Lookup Table (developed in-house)

Idea/Approach Details

Describe your Use Cases here

With the effectiveness of the proposed approach in various real-world scenarios and by bypassing the need for traditional expensive equipments such as

- Lidar
- Radar
- Stereo camera

The mono camera rule-based distance approximation offers a cost-effective and efficient solution for depth perception in autonomous systems. This has implications for industries other than Dragline in coal mining, such as

- Robotics
- Self-driving vehicles
- Smart surveillance systems

This approach has the ability of transforming fleets of Dragline to perform tasks of high-end autonomous vehicle just by adding few cameras and by implementing the algorithm.

Describe your Dependencies / Show stopper here

Dependencies:

- **Deep Learning Frameworks**
  High accuracies of DL Frameworks are vital for the performance of underlying layers
- **Rule-Based Reasoning**
  The rule-based framework for correlating depth cues with real-world distances is central to the approach.
- **Data Quality**
  High-quality image data is essential for accurate monocular depth estimation and object detection

Showstoppers:

- Adequate Training Data
- Model Integration Challenges
- Hardware Limitations
- Safety Concerns
- Bad Visibility
- Rule Incompatibility

Team Member Details

Mohamed Mafaz

Branch : Btech | Stream: Artificial Intelligence and Data Science | Year : III

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Branch : Btech | Stream: Artificial Intelligence and Data Science | Year : III

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