Model Development Phase Template

Date	19 March 2025
Team ID	739938
Project Title	VirtualEye – Lifeguard for Active Swimming Drowning Detection
Maximum Marks	5 Marks

Model Selection Report

The Model Selection Report for **Virtual Eye: Active Swimming Drowning Detection Using YOLOv5** focuses on applying real-time object detection techniques to improve water safety monitoring. By leveraging deep learning and convolutional neural networks (CNNs), specifically the YOLO architecture, this system identifies swimmers and potential drowning scenarios from surveillance footage efficiently and accurately. YOLO (You Only Look Once) is well-suited for this task due to its balance between speed and accuracy, making it capable of operating in real-time environments like swimming pools or aquatic centers.

Model Selection Report:

Model	Description
YOLOv5	YOLO is a family of object detection models designed for real-time applications. The model detects people and classifies their activity as swimming or drowning using bounding boxes around detected objects. It processes images in a single forward pass, offering significant speed advantages.

Key Components:-

Real-Time Detection: YOLO performs detection and classification in one pass through the network, making it ideal for live monitoring systems where immediate response is critical.

Pre-trained Weights and Transfer Learning

Models like yolov5s.pt or yolov8n.pt are pre-trained on the COCO dataset and fine-tuned on a custom dataset of swimming and drowning videos. This helps accelerate convergence and improve accuracy on limited data.

Custom Training with Labeled Dataset

The model is trained on a dataset where each image is labeled with bounding boxes for swimming and drowning classes. Training is done via the Ultralytics API using .yaml configuration files.