

**NATIONAL UNIVERSITY SCIENCE AND TECHNOLOGY (NUST)**

**Project Title:** Object Detection of roads turns and condition by using YOLO.

A Project Report Presented to

National University of Information Technology, Islamabad

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By

**Name:** Muhammad Raza S/o Noroz Ali

**CNIC:** 42201-0553411-3

**Email Address:** [raza15618@hotmail.com](mailto:raza15618@hotmail.com)

[razaguhary123@gmail.com](mailto:razaguhary123@gmail.com)

**GitHub:** https://github.com/MohdRaza123/Object\_Detection\_RoadsFinal

**OBJECT DETECTION MODULE PROJECT REPORT**

**GITHUB Repository: https://github.com/MohdRaza123/Object\_Detection\_RoadsFinal**

**INTRODUCTION**

In this group project, we have collected different images of road conditions that are: straight road, left turn, right turn and road blockage pictures. Then

Object detection model has been developed by YOLOV5 and Roboflow for identifying various road conditions and turns in images captured on roads in Gilgit. The primary goal is to enable the model to detect right turns, left turns, straight roads, and unexpected road conditions such as landslides and blockage.

In this project, data has been gathered, data labelled and the implementation of object detection models specifically YOLO (You Only Look Once) V5.

**PROJECT OBJECTIVES**

1. A dataset of road images in Gilgit, with a minimum requirement of 50 images per group, captured.

2. The collected data with information about road conditions and turns have been annotated and labelled.

3. To categorize images into predefined classes: right turn, left turn, straight, and unexpected Roboflow is used as train a classifier.

4. The YOLO (You Only Look Once) object detection model has been implemented to precisely locate and classify turns and unexpected road conditions in collected images.

5. The model's performance has been evaluated and fine-tuning has been done.

6. The entire process, including data collection, labeling, model training, and evaluation has been documented.

7. A GitHub repository has been created “**https://github.com/MohdRaza123/Object\_Detection\_RoadsFinal”** for the project and all project requirements, code, documentation, and datasets are added to the mentioned repository.

**PROJECT PHASES**

**PHASE 1: DATA COLLECTION**

I have gathered a diverse dataset of road images from Gilgit. These images have covered a variety of road types, conditions, and weather.

**PHASE 2: DATA LABELLING**

The collected dataset has been annotated and labelled which specifying each image represents a right turn, left turn, straight road, or an unexpected road condition (e.g., landslides and road blockage).

For number of classes and objects in labelling process, Roboflow is used as annotation tool

**PHASE 3: CLASSIFIER TRAINING**

The collected data are then classified and train via classification model e.g., a convolutional neural network (CNN) using the labelled dataset to categorize images into the predefined classes.

Evaluation of the classification model's performance using appropriate metrics such as accuracy, precision, recall, and F1-score has been performed.

**PHASE 4: YOLO IMPLEMENTATION**

The YOLO (You Only Look Once) object detection algorithm has been introduced and the dataset has been pre-processed to convert labels into YOLO-compatible format. Then the YOLO model has been trained to detect and classify turns and unexpected road conditions in images.

**PHASE 5: MODEL EVALUATION**

To Assess the YOLO model's performance we used metrics such as Mean Average Precision (mAP) and Intersection over Union (IoU).

Fine-tuned the model based on the evaluation results to improve its accuracy and robustness.

**PHASE 6: DOCUMENTATION**

A comprehensive document detailing the entire project, including the data collection process, annotation techniques, model training procedures, and evaluation results have been created.

All project requirements including code, and datasets are added to the

GitHub repository.

**PHASE 7 RESOURCES AND TOOLS**

• Python programming language

• Deep learning frameworks (e.g., TensorFlow, PyTorch).

• YOLOv3 or YOLOv4 for object detection.

• Annotation tools Roboflow

• Data collection resources (captured by students).

• GitHub or similar version control systems for code management and project repository.

• Documentation tools for creating project reports (e.g., Microsoft Word).