**High Impact Skills Development Program for Gilgit Baltistan**

**Object Detection Module Project**

**Project Title: Object Detection for Road Conditions and Turns in Gilgit**

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**GitHub:https://github.com/Malikabdulwahid/Object\_Detection\_Module\_Project**

**Introduction:**

In this report, I present the outcomes and findings of my project focused on developing an object detection model for identifying various road conditions and turns in images captured on roads in Gilgit. This project provided me with valuable hands-on experience in data gathering, data labeling, and the implementation of object detection models, specifically utilizing the YOLO (V5) algorithm.

**Project Phases:**

**Phase 1: Data Collection:**

I captured a diverse dataset of road images from Gilgit. These images covered a wide range of road types, conditions, and weather scenarios. I ensured that there were at least ten images per class, resulting in a diverse and comprehensive dataset.

**Phase 2: Data Labeling:**

I meticulously labeled the collected dataset, indicating whether each image represented a right turn, left turn, straight road, or an unexpected road condition, such as landslides. Roboflow's annotation tools were instrumental in streamlining and enhancing the labeling process.

**Phase 3: Data Preparation with Roboflow:**

To prepare the labeled dataset for model training, I used Roboflow. This step included converting labels into YOLO-compatible format and generating configuration files that facilitated model training.

**Phase 4: Model Training with Google Colab:**

I employed Google Colab to load the prepared dataset using Roboflow's APIs and train a YOLOv5 model. The objective was to detect and classify turns and unexpected road conditions in images.

**Phase 5: Model Evaluation:**

To evaluate the YOLOv5 model's performance, I employed critical metrics such as Mean Average Precision (mAP) and Intersection over Union (IoU). I fine-tuned the model based on the evaluation results to enhance its accuracy and robustness.

**Phase 6: Documentation:**

Throughout the project, I maintained comprehensive documentation. This documentation detailed the entire project, including data collection, annotation techniques, model training procedures, and evaluation results. Code snippets, visualizations, and accounts of challenges faced were also included.

**Resources and Tools:**

To accomplish this project, I utilized the following resources and tools:

* Data Collection Resources: Images captured by me, ensuring diversity.
* Roboflow: Employed for data labeling, data preparation, and managing the dataset.
* Google Colab: Utilized for model training.
* GitHub: Used for version control and project repository management.
* Documentation Tools: I used a combination of text editors and Markdown for creating the project report.

**Conclusion:**

This individual project not only provided me with valuable practical experience in computer vision and deep learning but also highlighted the importance of effective tools like Roboflow and cloud-based platforms like Google Colab. I successfully achieved the project objectives, culminating in a robust YOLOv5-based object detection model for identifying road conditions and turns in Gilgit. Through this project, I gained a deeper understanding of the challenges and complexities involved in developing object detection systems, and I look forward to applying these skills in future endeavors.