**Sign Language Prediction Model**

**Introduction**

This report outlines the development and implementation of a sign language prediction model. The model is designed to predict sign language gestures from uploaded images or videos. It features the ability to translate sign language phrases such as "How are you?" and "What is your name?" while switching specific predictions (e.g., "How are you?" predicted as "Who are you?"). Additionally, the model restricts predictions to between 6 PM and 10 PM.

**Background**

Sign language is a crucial form of communication for the deaf and hard-of-hearing community. The ability to interpret sign language through automated systems can significantly enhance accessibility and inclusivity. This project aims to leverage computer vision and machine learning to create a user-friendly tool for interpreting sign language from media uploads.

**Learning Objectives**

- Develop a machine learning model capable of predicting sign language gestures.

- Implement a user interface for uploading images and videos.

- Ensure the model makes predictions within a specified time frame (6 PM to 10 PM).

- Swap specific predictions to demonstrate custom model behaviors.

**Activities and Tasks**

1. Dataset Preparation

- Curate and preprocess a dataset of sign language images and videos.

- Annotate the dataset with corresponding gestures and phrases.

2. Model Development:

- Design and train a convolutional neural network (CNN) for image classification.

- Incorporate video processing techniques to handle video inputs.

3. Time-Based Prediction:

- Implement a function to check the current time and restrict predictions to the 6 PM to 10 PM window.

4. Custom Prediction Rules:

- Introduce logic to swap specific gesture predictions, such as translating "How are you?" to "Who are you?" and vice versa.

5. User Interface:

- Develop a Python GUI using Streamlit for easy media uploads and predictions.

**Skills and Competencies**

- Machine Learning: Model design, training, and evaluation using frameworks such as TensorFlow or PyTorch.

- Computer Vision: Image and video processing techniques.

- Python Programming: Development of the prediction model and GUI.

- Time Management: Implementing time-based restrictions for model predictions.

**Feedback and Evidence**

- User Testing: Conducted user testing sessions to gather feedback on the model’s accuracy and user interface.

- Performance Metrics: Evaluated the model using metrics like accuracy, precision, and recall. Performance evidence includes confusion matrices and classification reports.

**Challenges and Solutions**

- Dataset Quality: Ensuring a diverse and comprehensive dataset for training. Solution: Augment data and source additional datasets.

- Time-Based Restrictions: Implementing accurate time checks. Solution: Use Python's `datetime` module to enforce time constraints.

- Swapping Predictions: Creating a reliable mechanism to swap specific predictions. Solution: Hardcode specific rules within the prediction function.

**Outcomes and Impact**

- Accessibility: Enhanced accessibility for the deaf and hard-of-hearing community by providing a tool for sign language interpretation.

- Technical Skills: Improved competencies in machine learning, computer vision, and Python programming.

- User Engagement: Positive feedback from users during testing, indicating a user-friendly and functional model.

**Conclusion**

This project successfully developed a sign language prediction model capable of interpreting gestures from images and videos within a specific time frame. The implementation of custom prediction rules and a user-friendly interface demonstrates the potential of technology to bridge communication gaps and promote inclusivity.

This report template provides a structured overview of the project, including the development process, challenges, and outcomes. It can be expanded with more specific details and data as needed.