

# **Business Report: Real-Time Arabic ASL Detection**

## **1. Executive Summary**

The Real-Time Arabic ASL Detection project is designed to bridge the communication gap between individuals who rely on Arabic Sign Language (ASL) and the broader community, particularly in Arabic-speaking countries. The primary goal of the project is to make communication more accessible for people who use ASL by developing an AI-powered system capable of interpreting Arabic ASL in real time. The project began on September 7, 2024, and is expected to be completed by October 2, 2024. Currently, the project is in the final stages, with model deployment and testing set to be completed before the deadline. So far, significant progress has been made, including the selection of a public dataset specific to Arabic ASL and the successful training of a pretrained YOLO 8 model using this data. The next phase will focus on deployment and testing to ensure the system performs as expected in real-world conditions.

## **2. Project Objectives**

The primary objective of the Real-Time Arabic ASL Detection project is to develop an AI-driven system capable of recognizing and interpreting Arabic Sign Language in real time. This solution is intended to enhance communication accessibility for deaf individuals in Arabic-speaking countries, helping to close the gap between those who use ASL and others in society. The system will provide seamless communication support, particularly in public spaces, educational institutions, and workplaces.

In the short term, the project aims to successfully train and deploy a reliable model using the YOLO 8 algorithm. Ensuring high accuracy in detecting ASL gestures and facilitating smooth real-time translation are critical goals.

Long-term objectives include expanding the application of the model beyond real-time communication to enable integration with large language models (LLMs). This would make it easier for ASL users to interact with advanced AI systems, further enhancing their ability to engage in digital conversations and access AI-driven services.

## **3. Progress Report**

Significant progress has been made on the Real-Time Arabic ASL Detection project, particularly in the areas of data collection, model training, and visualization. The team has successfully sourced and analyzed a public dataset specific to Arabic Sign Language, which forms the foundation for training the YOLO 8 model. The data has been visualized to understand the distribution of ASL gestures, providing crucial insights that informed the training process. Subsequently, a pretrained YOLO 8 model was utilized and trained using this dataset, achieving promising results in recognizing and interpreting Arabic ASL gestures.

Currently, the project is focused on the deployment and testing phase. This involves ensuring the model's real-time capabilities are functional and meet the necessary accuracy standards in real-world scenarios. Testing will be conducted to evaluate the system's performance and gather feedback to make any needed adjustments.

Looking ahead, the next phase will involve completing the project's documentation. This includes finalizing both the technical documentation and business report, which will outline the system's features, functionality, and future plans.

#### **4. Budget and Financials**

The Real-Time Arabic ASL Detection project has not required a formal budget, as the resources utilized thus far—such as the public dataset and existing computational tools—were readily available. The project team successfully completed data collection, visualization, and model training without any significant financial expenditures.

However, it is important to note that the training process could have been accelerated if access to higher-performance GPUs had been available. Utilizing more advanced computational resources, such as cloud-based GPU services, would have reduced training time and potentially enhanced the model's accuracy and efficiency.

#### **5. Challenges and Risks**

One of the primary challenges faced during the Real-Time Arabic ASL Detection project was identifying a dataset that could be both suitable for training and capable of generalizing to real-life scenarios. While the team ultimately selected a public dataset specific to Arabic Sign Language, the limited availability of high-quality, comprehensive ASL datasets initially posed a significant obstacle. Ensuring that the chosen dataset could accurately represent the diversity of gestures used in real-world communication was crucial to the project's success.

There is a risk that the model may not fully generalize to all real-life environments and variations in sign language use, potentially affecting its accuracy in diverse situations. This risk will be mitigated through extensive testing during the deployment phase.

#### **6. Team and Resources**

The Real-Time Arabic ASL Detection project is being executed by a dedicated team, each member bringing specific expertise to the project. Muhap Ayman is responsible for finding a suitable model and conducting the testing phase to ensure that the system meets performance standards. Habiba Mohammed focuses on identifying the best dataset, ensuring that the training data accurately represents Arabic Sign Language. Zohour Daa handles data preprocessing, visualization, and documentation, playing a critical role in organizing the project's outputs and maintaining clear communication throughout the team.

The team is equipped with the necessary resources, including access to computational tools and public datasets, to successfully complete the project. Collaboration among team members has been effective, allowing for a streamlined workflow and shared knowledge.

## **7. Timeline and Milestones**

The project commenced on September 7, 2024, with several key milestones already achieved. The team successfully identified and selected a suitable public dataset for training the model. Subsequently, they trained the YOLO 8 model, which marked a significant milestone in the project's progression.

As the project moves into the deployment and testing phase, the next milestone will involve evaluating the model's performance in real-world scenarios. Following this, the team aims to finalize all documentation by the project's conclusion on October 2, 2024. The team remains committed to adhering to the timeline and addressing any potential delays proactively.

## **8. Next Steps**

In the upcoming phase of the Real-Time Arabic ASL Detection project, the team will focus on deploying the trained YOLO 8 model and conducting rigorous testing to evaluate its performance in real-world scenarios. This will involve assessing the model's accuracy and responsiveness in recognizing Arabic Sign Language gestures under various conditions. Additionally, feedback will be collected from initial users to identify any areas for improvement.

A critical next step will be exploring the integration of the ASL detection system with large language models (LLMs). This integration aims to facilitate seamless communication for ASL users, enabling them to interact with advanced AI systems more effectively. The team will investigate how the ASL detection outputs can be translated into text inputs for LLMs, enhancing user engagement and providing access to a broader range of digital services.

## **9. Conclusion and Recommendations**

The Real-Time Arabic ASL Detection project represents a significant step toward enhancing communication accessibility for individuals who use Arabic Sign Language. With the successful training of a YOLO 8 model and the planned deployment and testing phases, the project is on track to achieve its goals within the established timeline.

Overall, this project not only aims to facilitate communication for ASL users but also sets a foundation for further developments in assistive technology within Arabic-speaking countries.