

Problem Definition and Solution Strategy

Problem Definition

The aim of this project is to design and implement an automated passenger boarding kiosk for airports using computer vision and AI technologies. The kiosk will perform several tasks, including verifying passenger identity, matching this with flight information, and ensuring no prohibited items are carried onboard. This solution targets increasing the efficiency and security of the boarding process by minimizing human intervention.

Core Functions:

1. **Passenger Verification:** The kiosk will scan and verify passenger IDs and boarding passes, extracting essential information from these documents.
2. **Facial Recognition:** A 15-30 second video will be captured to match the live person with their ID photo.
3. **Prohibited Item Detection:** The kiosk will scan carry-on baggage for prohibited items, such as lighters, to prevent them from being carried onto the plane.
4. **Validation and Notification:** If all verifications pass, the passenger will be cleared for boarding; otherwise, the system will suggest they seek assistance from an airline representative.
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Solution Strategy

To implement this solution, the following Azure services and strategies will be employed:

1. Azure Form Recognizer:

- **Purpose:** Extract passenger information from boarding passes and ID cards.
- **Data Validation:** Compare extracted data against the flight manifest to ensure accuracy. If discrepancies are found, the system will flag them for manual review.

2. Azure Face API & Video Indexer:

- **Purpose:** Perform facial recognition by analyzing the video of the passenger and comparing it with the photo on the ID card.
- **Performance Metrics:**
 - **Accuracy:** The primary metric, aiming for 90% or higher to minimize false positives and negatives.
 - **Precision & Recall:** Focus on high precision (minimizing false positives) and recall (minimizing false negatives), with thresholds set to 85%.
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3. Azure Custom Vision:

- **Purpose:** Identify prohibited items in carry-on baggage by analyzing images of the baggage contents.
- **Performance Metrics:**
 - **Accuracy:** Set at 90% or higher to ensure reliable detection of items like lighters.
- **Validation:** The model will be trained using sample images and tested rigorously to ensure it meets the accuracy threshold.

4. End-to-End Validation:

- After processing all data through the above services, the system will validate the results.
- **Final Decision:** If all checks are passed, the kiosk will display a message allowing the passenger to board. If any check fails, the passenger will be directed to seek assistance.

This comprehensive solution leverages Azure's cognitive services to create a secure and efficient boarding process, ensuring that passengers are verified, baggage is checked for prohibited items, and boarding is streamlined with minimal human interaction.