Project Problem Description

Project Objective:

Develop an avant-garde passenger boarding kiosk, embedding Artificial Intelligence and Computer Vision, to refine and streamline airport operations, ensuring an autonomously managed, hassle-free airline passenger onboarding experience.

Core Functionalities:

In its optimal operational condition, the kiosk will:

- Facilitate passengers in scanning their ID card and boarding pass.
- Extract and authenticate passenger data from the boarding pass and ID card.
- Record a 10-second video for facial recognition, validating the identity against the ID card.
- Conduct a scan of the passenger's carry-on baggage, identifying and flagging prohibited items.
- Extend a warm greeting to passengers upon successful validation or guide them to seek assistance from airline staff if any discrepancies occur during the validation process.

Simulated Kiosk Experience:

- Develop a passenger manifest with a minimum of 5 passengers, inclusive of digital IDs and boarding passes.
- Incorporate the project owner’s fabricated ID and a 15-30 second video to validate the facial recognition mechanism.
- Implement carry-on baggage scans, particularly for lighters, and flag passengers carrying prohibited items.
- Utilize Azure computer vision services for data processing, simulating a real-time automated airline boarding procedure.

Input Data:

- Passenger flight manifest (min. 5 entries).
- Passenger ID cards (min. 5, including facial photo for the project owner).
- Boarding passes (min. 5).
- 15-30 second facial video of the project owner.
- Photos of passenger carry-on items (using project sample images).

Solution Strategy:

- Leverage Azure Form Recognizer to develop a model proficient in extracting passenger details from boarding passes.
- Use Azure Form Recognizer's digital ID service to extract facial and personal information from passengers' digital IDs.
- Validate extracted boarding pass information against the manifest list.
- Ensure the authenticity of an individual if their name is listed in the manifest, by corroborating details with the personal ID.
- Utilize Azure Video Indexer to validate the face photo from the digital ID against the passenger video.
- Develop a machine learning model to identify lighters using Azure Custom Vision services and lighter images provided in the project.
- Test the Azure custom vision model with sample carry-on images provided in the project.
- Display a final validation message upon successful boarding pass validation.

Conclusion:

The essence of this project lies in amalgamating Azure's cutting-edge computational, AI, and computer vision capabilities to devise a kiosk that is not only fully autonomous and minimizes errors but is also passenger-friendly, heralding a future-ready boarding experience. Built upon a foundation of robust simulation, the project not only aims to understand the potential real-world challenges but also to innovate current methodologies, crafting an efficient, secure, and seamless passenger boarding procedure.