Problem Definition

What is the problem: Pre-COVID-19/traditional social, economic, and health protocols are no longer enough to mitigate current COVID infections– especially when countries are choosing to slowly open up borders to encourage travel whilst COVID infection rates continue to rise.

Why is this a problem, and who is it a problem for:

Traditional protocols no longer work, as they are not in sync with the current health climate. Since border and flight inspections require a lot of human interaction between travelers and government employees (e.g. customs & border officers, airport ground staff, etc.), these old conventions pose an economic, security, and health problem for travelers and government entities. In terms of economic aspects, travelers who have paid for their flights will want to travel, and government employees who have made an effort to work during the pandemic will want to stay employed, but neither can do so if there are no COVID-concious protocols in place to encourage these objectives. In terms of security, travelers must be verified to board flights, and government employees must be present to assist the safety and security of their travels, but neither entities can do so with a huge crowd presence anymore. In terms of health aspects, travelers and government employees are encouraged to get vaccinations and wear masks, but people are people– and there is no sure way of convincing them to follow these guidelines. Until we see proof that COVID is no longer a mass health threat to the human population, people should continue automating protocols to mitigate its infection to the human population.

How will the problem be solved:

To solve this issue, we should consider automating these traditional protocols with the help of computer vision services:

1.) Facial recognition to identity travelers with kiosk machine
2.) Form recognition to authenticate traveler's information with kiosk machine
3.) Object detection to identify prohibited carry-on items with security gate scanner
4.) Good interior layout of kiosks and security gate scanners through the airport

Solution Strategy

Where are we now:

Due to how quick the pandemic was enforced, a lot of airports were not prepared to automate comprehensive safety and security protocols in an efficient manner. So, airports either shutdown completely, or they've implemented very minimal automation to assist their travelers. Since many countries are encouraging traveling now, and COVID variants are still susceptible to infecting people, shutting down the airports and minimal automation aren't sustainable anymore.

Where will we be with solution in place:

With a more comprehensive automation system in place, this will set the standard for ensuring safe, healthy, and secure travels for travelers and government employees alike. In terms of

security, government employees can depend on kiosks to authenticate travelers for their flight, and focus on employing workers where human presence is required in the airport (e.g. deep cleaners in the airport, airport medics in emergency centers, etc.) In terms of health, automating tasks that do not require human interaction will help mitigate potential COVID-19 infections. Also, automating these systems eliminates human interaction or confrontation that are done purely out of prejudice or cognitive biases (e.g. traveler "looks" suspicious so this justifies TSA or border officers to interrogate or give them a hard time).

<u>How are we going to get there:</u>

Some of the computer vision services to implement are:

1.) Facial recognition and object detection: These technologies enable kiosk machines to authenticate whether the user is who they claim to be. When a traveler checks in, they will be prompted to scan their passport/ID card, and then look toward a camera on the kiosk. If the face on the passport/ID card matches the face being shown in front of the camera, then the person is authenticated. If not, they will be prompted for a real human to authenticate them.
    - Facial recognition can also detect sentiment of the person at the moment of authenticating them. In case the airport cares whether the traveler is content or not at that moment in time, the kiosk is able to retrieve that information.
2.) Form recognition: This technology enables kiosk machines to parse out traveler's information, and whether their information matches what's in the flight manifest table. When a traveler buys a plane ticket and enters their registration information, this information will be sent to a database for secure storage. Once the traveler goes to an airport kiosk for check-in, and scans their boarding pass, the kiosk will be able to see whether the information on the traveler's boarding pass matches that of the flight manifest table. If so, the traveler is verified to board (e.g. if they've checked in on time). If not, they will be prompted for a real human to verify their boarding pass.
3.) Object detection: This technology enables security gate scanners to parse out prohibited items in carry-on items. When a traveler lays out their carry-on items through a tray scanner, that scanner will identify prohibited items, should there be any. If the traveler's carry-on item does not have prohibited items, they can enter at their airport gate. If not, then the traveler's carry-on item will be confiscated by a TSA officer.
4.) Efficient layout of kiosks throughout the airport: Since travelers want to validate their information and verify themselves without too much hassle, kiosks should be placed not too far from the airport entrance. Kiosks should also be distributed at a reasonable distance (e.g. 6 feet) from one another to encourage safe distancing.
5.) Security gate scanners should be placed generously throughout the security gates, so travelers can assist themselves in checking their items in, and place each item flat in each bin they're using. The scanner will have a camera taking pictures from a top-down view, and identify whether there are prohibited items in the bin.