Background Information

- The Transportation Security Administration rolled out a new expedited screening program, the TSA Pre✓®, in October of 2011.
- The TSA has begun pre-screening passenger at participating airports. Approved applicants can get sent to expedited and less restrictive screening lanes at the airport. Passengers can apply to a Known Traveler Program to increase chances of being selected.
- Currently over 130 airports support the expedited screening program, which is based on the utility function seen in (Figure 1) [1].

Notable Terms

Utility Functions For Applicants

- The best responses for normal applicants are included in (Figure 2).
- When \( \alpha \) increases all decision variables increase.
- The utility functions for applicants can be seen in (Figure 5). The model seen in (Figure 2) gives a visual representation of the parallel queueing process, in which adversary and normal applicants apply for expedited screening.

Utility Function for Approver

- The destroyer decides the probability of letting a previously approved applicant into the expedited lines based on the utility function seen in (Figure 6).

Payoff Game Tree

- The game tree for the model is shown in (Figure 4).
- We could also look into potential applicants with different attributes in regards to their inherent risk when applying.

Sensitivity Analysis

- We looked at how the optimal values for decision variables reacted to changes in the error values in the red line and the application process. The results are illustrated in (Figure 11).

Further Discussion

- There was further research that was conducted for this paper that deals with how the model changes as the number of utilized benefits changes for passengers in the expedited lines. This was omitted due to the lack of space on the poster.

Designing human experiments to validate the theoretical model outlined in this project would provide more practical results.

We could also look into potential applicants with different attributes in regards to their inherent risk when applying.

Utility Functions For Applicants

- The best responses for normal applicants are included in (Figure 9).
- An illustration of how these best responses are affected by the adversary applicants applying \( P_e \) which stays at zero.

Best Responses for Applicants

- The best response for adversary applicants is shown in (Figure 10).
- An illustration of how the best response is affected by the adversary applicants applying \( P_e \) which stays at zero.

Game Theoretical Parallel Screening Model Motivated by TSA Pre✓® Program

Cen Song, Christopher Diaz, and Jun Zhuang Ph.D
songcen22@126.com, cmdiaz2@buffalo.edu, jzhuang@buffalo.edu

Department of Industrial and Systems Engineering, University at Buffalo, The State University of New York

Parallel Queueing Model

- The objective of this research was to create a parallel queueing model that was motivated by the TSA Pre✓® expedited screening lanes.
- The model seen in (Figure 2) gives a visual representation of the parallel queueing process, in which adversary and normal applicants apply for expedited screening.

Utility Functions For Applicants

- The utility functions for applicants can be seen in (Figure 5).
- The model in (Figure 2) gives a visual representation of the parallel queueing process, in which adversary and normal applicants apply for expedited screening.

Utility Functions For Applicants

- The best responses for normal applicants are included in (Figure 9).
- An illustration of how these best responses are affected by the adversary applicants applying \( P_e \) which stays at zero.

Best Responses for Applicants

- The best response for adversary applicants is shown in (Figure 10).
- An illustration of how the best response is affected by the adversary applicants applying \( P_e \) which stays at zero.

Utility Functions For Applicants

- The utility functions for applicants can be seen in (Figure 5).
- The applicants will decide at what rate to apply for the expedited screening program based on the parameters and payoff of their function.

Utility Functions For Applicants

- The utility functions for applicants can be seen in (Figure 5).
- The applications will decide at what rate to apply for the expedited screening program based on the parameters and payoff of their function.

Utility Functions For Applicants

- The utility functions for applicants can be seen in (Figure 5).
- The model seen in (Figure 2) gives a visual representation of the parallel queueing process, in which adversary and normal applicants apply for expedited screening.

Utility Functions For Applicants

- The utility functions for applicants can be seen in (Figure 5).
- The applications will decide at what rate to apply for the expedited screening program based on the parameters and payoff of their function.