An Optimal, Closed-Loop Passenger Screening Strategy for Enhancing Aviation Security

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ABSTRACT
Passenger screening at aviation security checkpoints is a critical component in protecting airports and aircraft from terrorist threats. Recent developments in screening device technology have increased the ability to detect these threats; however, the average amount of time it takes to screen a passenger still remains a concern. This paper addresses the queueing process for a multi-level airport checkpoint security system, where multiple security classes are formed through subsets of specialized screening devices. A closed-loop assignment policy is obtained that balances the expected number of true alarms with the expected amount of time a passenger spends in the security system. Performance of a two-class system is compared to that of a security system containing primary and secondary levels of screening, where the selection process for passengers undergoing secondary screening is fine-tuned. The key contribution is that the optimal, closed-loop passenger screening strategy obtained herein allows airport security operations personnel to increase security and passenger throughput by efficiently and effectively utilizing available screening resources.