*CSE 561: Modeling & Simulation Theory and Application*

**Amusement Park optimal ratio of fastpass buyers**

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**Motivation**:

Amusement parks including Disneyland and Universal Studio adopt a FastPass system that gives visitors priority access to rides. For an additional fee for FastPass tickets, visitors don’t have to wait as long. For each ride, they have two lines: a line for FastPass visitors and normal visitors. Assume that all the visitors buy a FastPass ticket, and then the expected waiting time will be the same as if this system did not exist. In this project, we aim to find the optimal ratio of FastPass ticket purchasers to achieve the targeted waiting time gap between two lines through simulation using various variables. These findings will help amusement parks decide on FastPass ticket prices.

**Variables and settings**:

| Input | Ratio of FastPass ticket purchasers. | |
| --- | --- | --- |
| Variables | Number of visitors | Randomly set the number of visitors in certain range. |
| Entrance time for each tourists | People will enter the park at specific intervals. |
| Leaving time for each tourists | People will leave the park at specific intervals. |
| Distance (time) between attractions | Distance (time) between attractions will be set to different constant numbers. |
| Duration on each attraction | Duration on each attraction will be set different. |
| Priority order list | Each tourist will have their priority order list for attractions. |

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| Output | Wait time difference between FastPass buyers and normal ticket buyers of each attraction | |
| --- | --- | --- |

We will assume that FastPass is effective when the average waiting time for regular ticket buyers is twice as long as the average waiting time for FastPass ticket buyers. There are variables that change depending on the ratio of FastPass ticket buyers, and they affect the final output, which is the wait time for each line. We do not consider other factors such as giving priority to disabled people, or the elderly. We will perform several experiments with different ratios and variable ranges to see how the waiting time changes depending on the ratio. Consequently, through simulation, we can determine to what extent we adjust the ratio of FastPass ticket buyers in order to achieve a targeted gap in waiting times.

**References**:

[1] <https://www.universalorlando.com/web/en/us/tickets-packages/express-passes>

[2] <https://www.nerdwallet.com/article/travel/how-does-disney-fastpass-work>

[3] <https://queue-times.com/parks/28/map>

[4] https://queue-times.com/pages/api