Assignment 3

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Notes

Main scene located in <Assets/Scenes/Main Scene.unity>. To add more chairs or humans to the scene, simply duplicate one of the existing ones or drag in their respective prefab from <Assets/Prefabs>.

Handling Pathfinding & Obstacles

Humans

To simplify the number of calculations for human pathfinding, the humans check for obstacles on their path every frame, but only recalculates their path if one is detected. Obstacles are detected via the NavMesh's partitions whose colliders check for obstacles inside them each frame. This lets the A* algorithm, which handles the pathfinding, avoid every partition that contains an obstacle.

Chairs

Chairs have significantly more calculations since they pathfind towards the humans' paths. They go towards a target on a random human's path, which they have to check is still part of the human's path each frame—otherwise, the target and path are both recalculated. The chairs also use A* algorithm, with the same obstacle avoidance mechanism as the players.

Performance

Results

The results were recorded over a period of 1 minute, so every average and median is a 1-minute average or median.

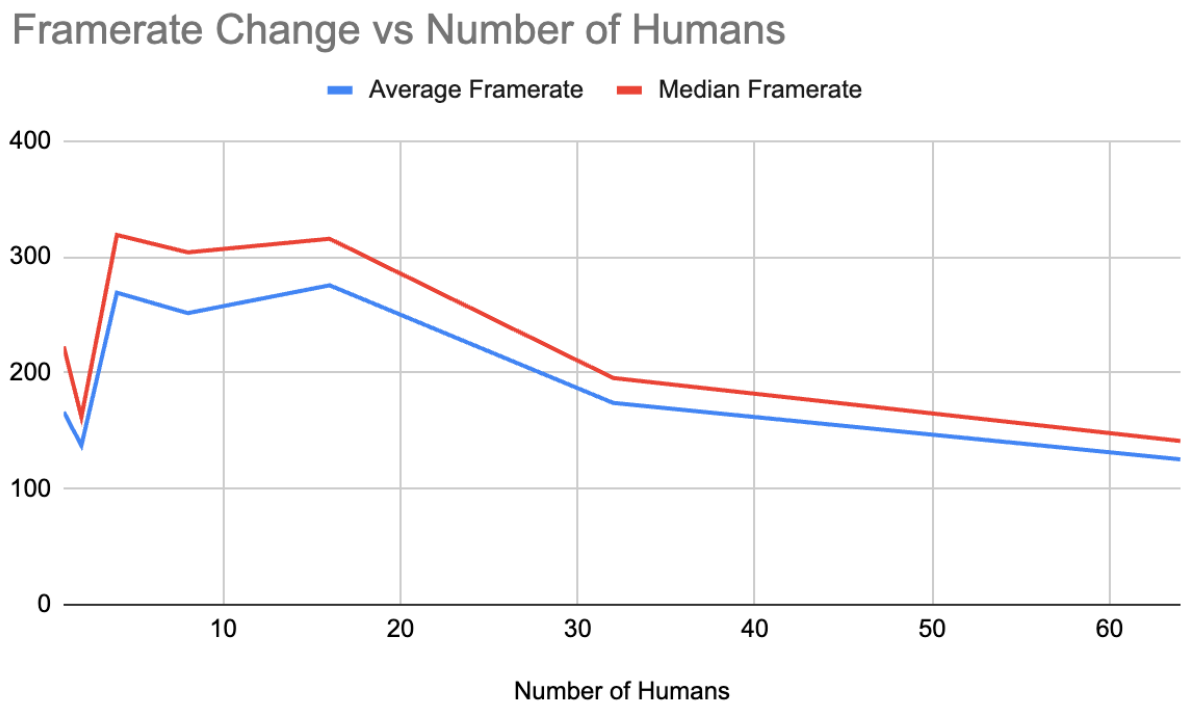
Varied Number of Humans

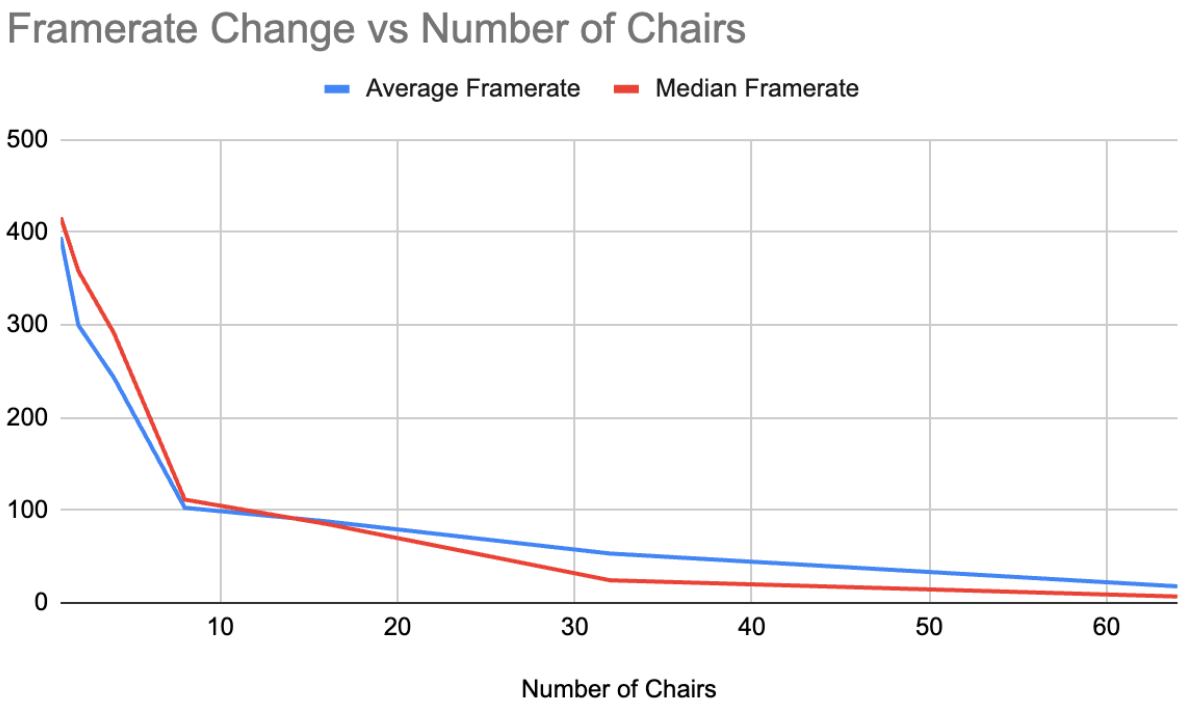
Number of Humans	Number of Chairs	Average Framerate	Median Framerate	Maximum Framerate	Minimum Framerate	Total Resets	Succesful Hits
1	4	166.2887	222.6876	428.4667	0.8658841	24	22

2	4	137.3553	161.9453	370.9474	0.8351811	33	32
4	4	269.0961	318.8875	327.9511	0.8278851	56	56
8	4	251.4773	303.8915	359.0052	0.8459476	45	44
16	4	275.4708	315.6016	338.0582	0.7875655	80	80
32	4	174.0188	195.5056	265.1946	0.69821	88	88
64	4	125.3654	141.2049	229.7856	0.8047618	130	130

Varied Number of Chairs

Number of Humans	Number of Chairs	Average Framerate	Median Framerate	Maximum Framerate	Minimum Framerate	Total Resets	Succesful Hits
4	1	394.8014	416.2012	420.7499	0.8721176	42	42
4	2	299.6791	358.2138	364.6689	0.7733711	39	39
4	4	243.1777	291.3073	326.1894	0.8522193	46	46
4	8	102.6416	111.4553	323.9339	0.8314186	29	28
4	16	87.9872	85.16831	189.5753	0.8612338	28	26
4	32	53.23929	24.36731	218.7846	0.9297399	24	22
4	64	17.85425	6.86923	142.2677	0.8297745	16	14





Discussion

The results of varied numbers of chairs and humans indicate that the human pathfinding program is much more efficient than that of the chairs. This makes sense, given that the chairs pathfind towards a point in the human path that is constantly changing, requiring high computational power.

The data also shows that the humans practically always win, which indicates that level size, chair strategy, and human strategy is somehow imbalanced. In the future, I would improve the efficiency and intelligence of the chairs' strategy in order to increase their chances of success. I would also decrease the size of the level in order to make it more difficult for humans to win every time.