Simulating Soccer Gameplay Using Agent-Based Models

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Abstract:

Soccer is the most global sport in the world and the reason for that may be due to its unpredictability leading to exciting matches. Many would say it is near impossible to predict matches perfectly.

This study focuses on exactly that. We began by creating a software to simulate soccer matches with sliders to affect how different players perform and interact with each other. We studied the performance of players in Serie A (Italian first division) teams and transfer their real-life skills and abilities into the simulation software. Traits such as how selfish players are with the ball, how far away from the goal they usually shoot from, and who they tend to pass to more often were come of the ones taken into account. We would run multiple simulations of the same match fixture in order to achieve a consistent result.

Testing involved creating the code for the simulation software as well as researching players attributes in real time games then computing these traits in the simulation.

Results:

- Main observation was that players selfishness plays a huge role in the scoreline of matches.
- As seen in the graphs, as attacking/defensive selfishness shifts, so does the amount of goals scored.
- When a teams attack is more selfish, they end up scoring a lot more than when they are elss.
- On the contrary, when fully selfish in attack, average of 2.40 goals conceded, when fully selfish in defense, only 1.75

Score AS:0 DS:10
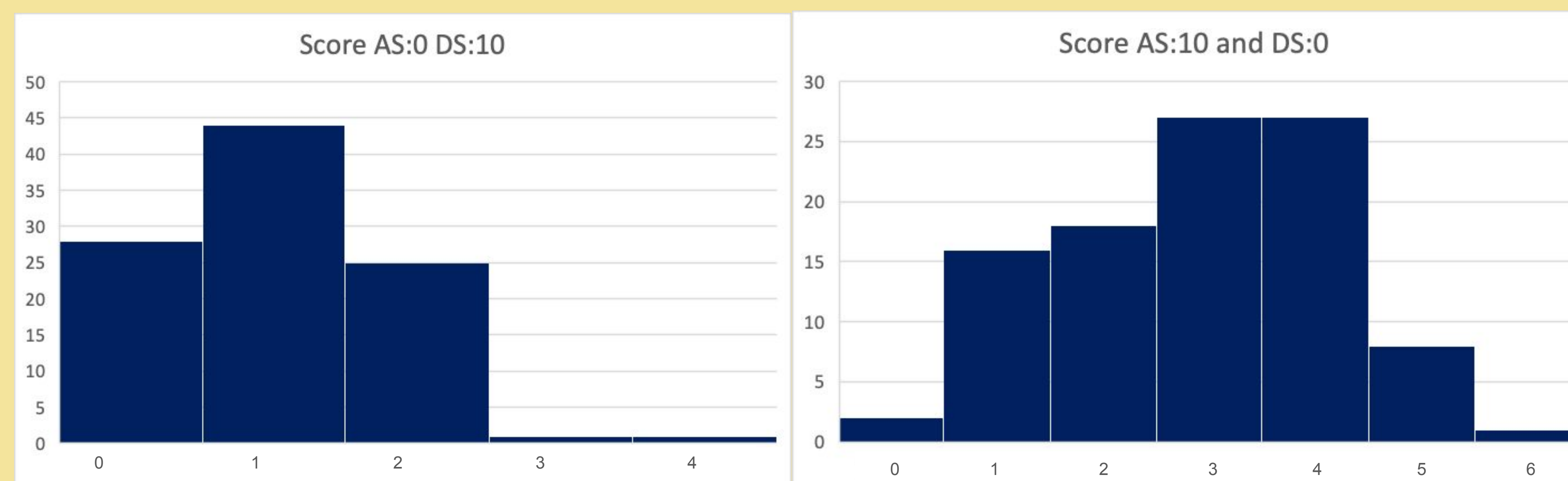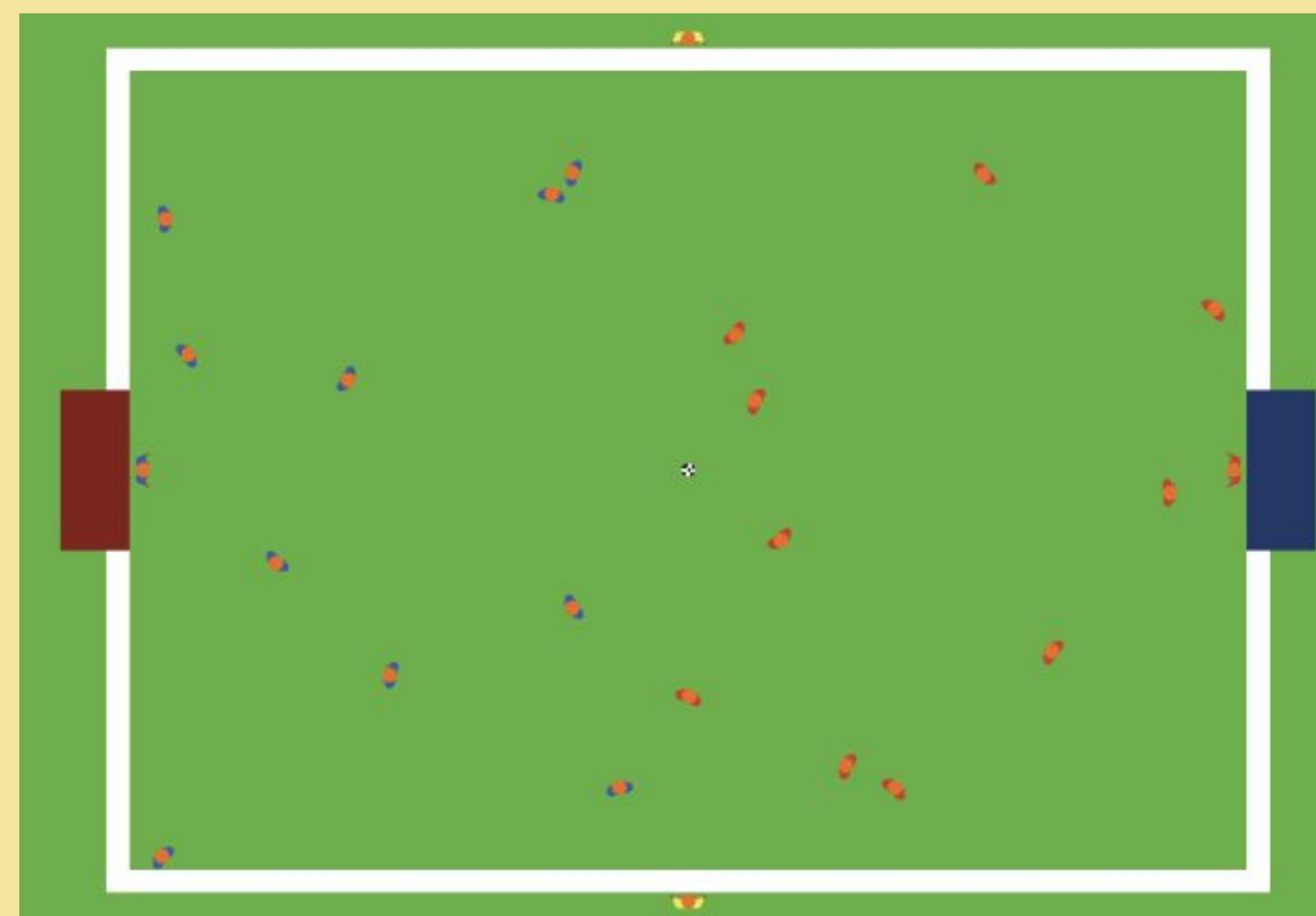
	Red Team	Blue Team
Mean	2.40	2.90
Median	2	3
Mode	2	4
Red Wins	35	
Blue Wins	54	
Draws	10	

Score AS:10 and DS:0
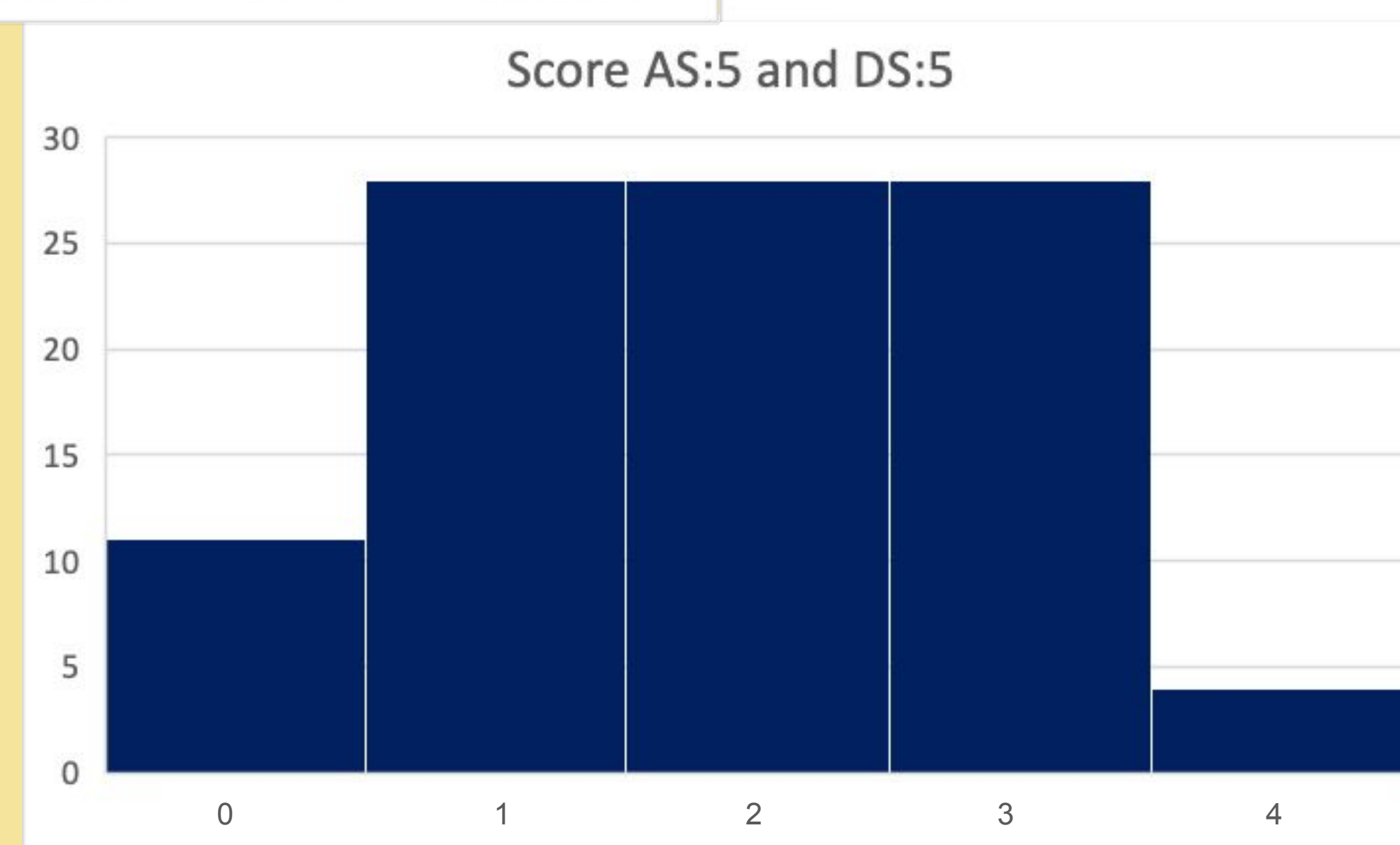
	Red Team	Blue Team
Mean	1.75	1.02
Median	2	1
Mode	2	1
Red Wins	60	
Blue Wins	20	
Draws	19	

Score AS:5 and DS:5

	Red Team	Blue Team
Mean	1.93	1.86
Median	2	2
Mode	2	2
Red Wins	40	
Blue Wins	38	
Draws	21	

Methods:

- **How well do soccer teams compete up against opposition sides?**
- **How does each player interact with one another?**
- **Measured factors such as each players attributes:**
  - Is a player more selfish and decides to pass less while shooting more?
  - Does this player just like to attack and drift out of position?
  - What spaces does this player like to go into more.
- **By understanding how real-life players interact with each other. By studying all of this data and running multiple simulations, we were able to find how well teams operate then find out how well they compete against other teams.**

References:

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Acknowledgments:

I would like to thank Dr. Nooranidoost for being such a great mentor throughout this research process I'd love to give thanks for being trusted with this project and for his unwavering support through the ups and downs of the project.