Using Graph Networks to Optimize NBA Games

Final Project Presentation

ECE 5260/ORIE 5735: Graph Based Data Science for Network Systems

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Intro & Problem Formulation

Reduce Travel Time

Longer travel results in shorter practice and recoup time as well as larger carbon footprint

Increase Attendance

Attendance has dropped as much as 5% since the 2018-2019 season

Approach

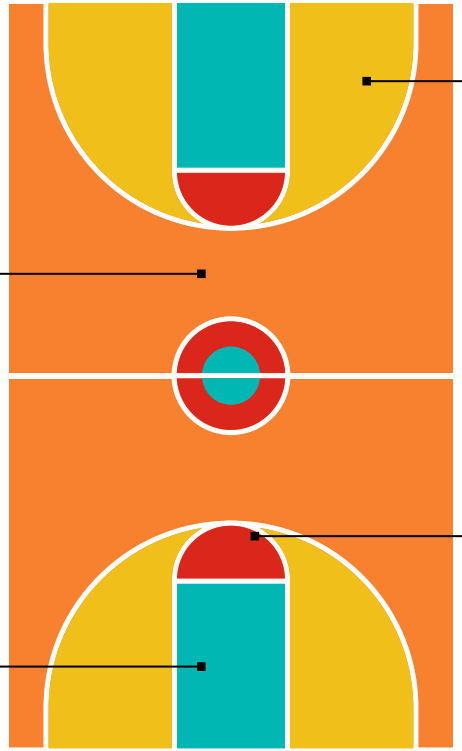
Recommend New Conferences & Divisions

Graph

Graph with arena locations as nodes and distance between arenas as weights

Method

Node2Vec
Spectral Clustering
K-Means



Find Games which Maximize Attendance in a Given Day

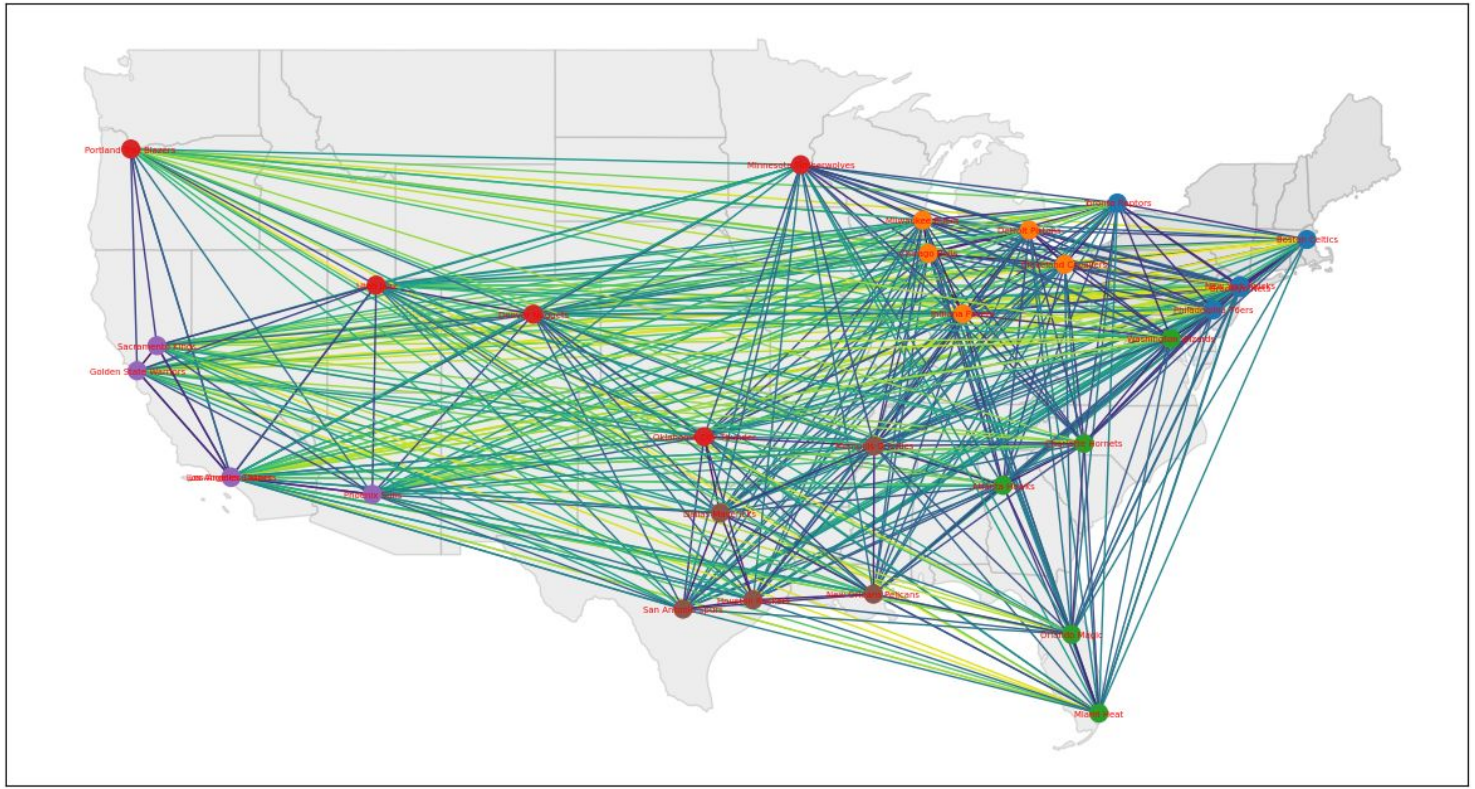
Graph

Bipartite graph where one set of nodes are NBA teams and other set of nodes are arena locations. Edges are average attendees at that NBA team and location configuration.

Method

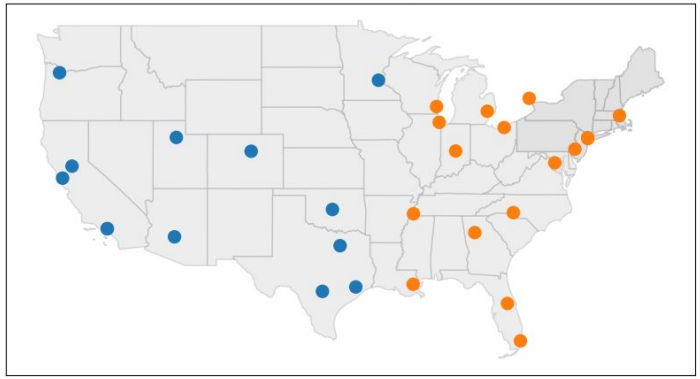
Edmonds-Karp

NBA Arenas and Distance as Edges Graph

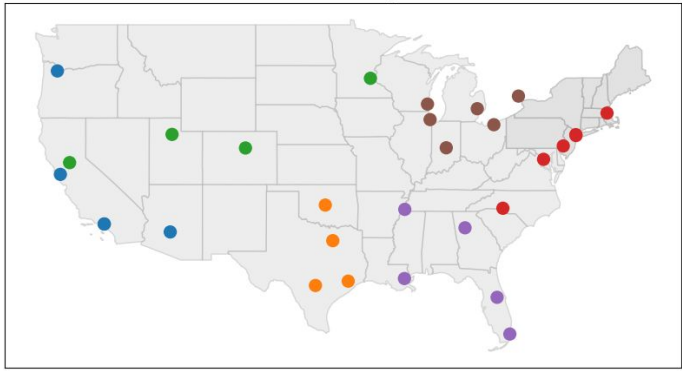


New Conferences & Divisions Results

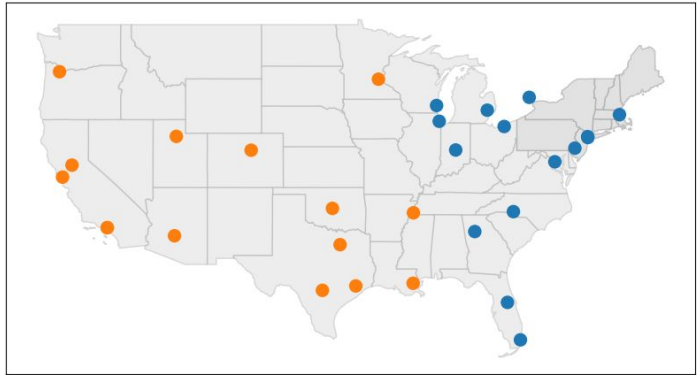
NBA teams in new conferences by travel distance



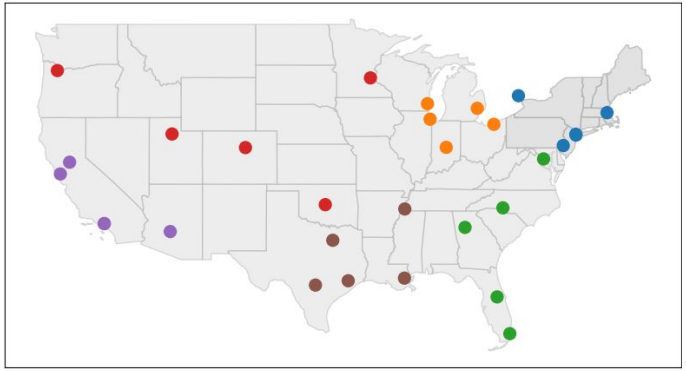
NBA teams in new divisions by travel distance



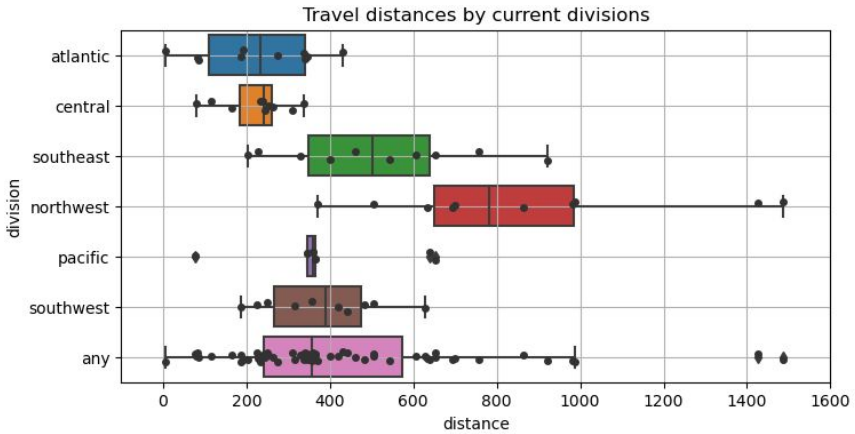
NBA teams in current conference

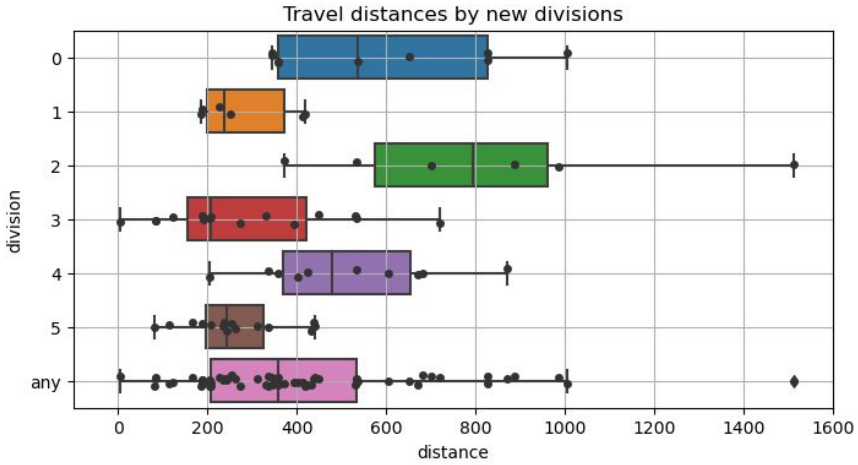


NBA teams in current divisions



New Conferences & Divisions Analysis





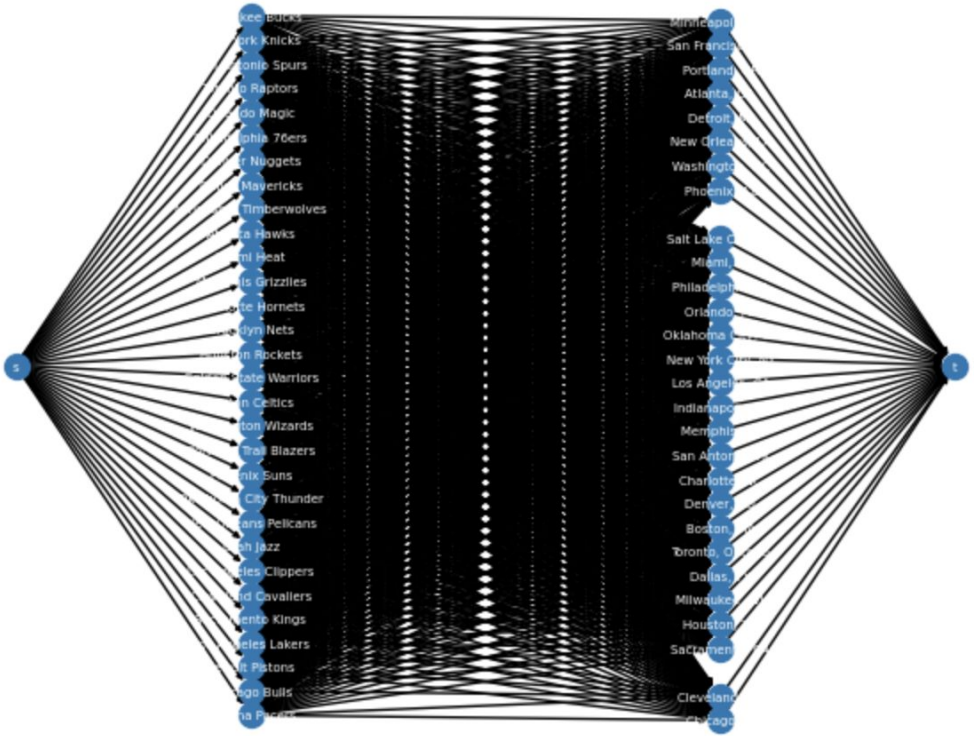
4.4%

Reduction in Mean Travel Distance

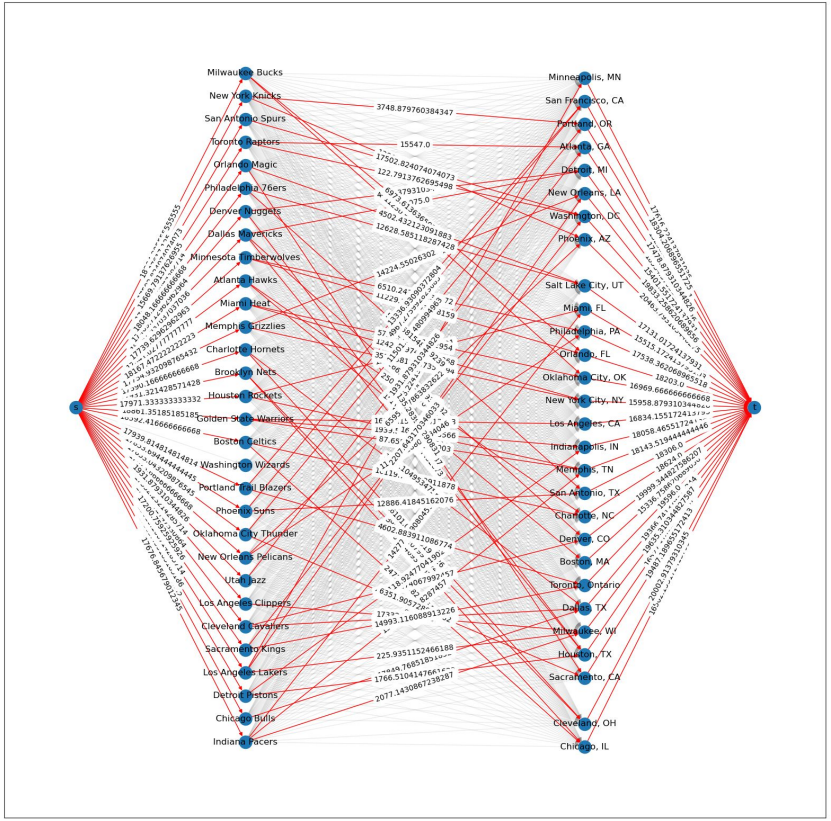
7.4%

Reduction in Travel Distance Variance

Maximizing Game Attendance Graph



Maximizing Game Attendance Flow Diagram



Conclusion

New conferences /divisions

Using graph networks and clustering, we've been able to propose new conference and division team compositions which will reduce travel

Maximize Attendance

Using graph networks and Edmonds-Karp, we've been able to create recommendations for games which will maximize attendance

Bring tech to NBA

With these new methods, we've demonstrated how the NBA can leverage graph networks to optimize their operations

Use for other Leagues

Future work could include using our clustering and away game recommendations for the G-League and WNBA

Thanks!