SYSM 6302 Project Proposal:
FRC Team Match Network

Jonas Wagner

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Abstract

In this project multiple networks will be created and analyzed on match data between FRC teams for various years of competition. In each network graph, a team will be represented by nodes and individual matches will be included as edges. Each of these graphs will be analyzed based on various centrality metrics and graph properties for different match attributes.

1 Dataset

The data for this project is match data for multiple years (1992-2019) of FRC competition matches. *Include information about FIRST in actual presentation/report* A focus will be on the years 2013-2020[1] as these are the years I personally have actually been involved in FIRST.

2 Graph Structure

A different graph will be constructed for each year of competition. This will consist of all the teams competing (nodes) and the matches that are played (edges). Since multiple edges may be connected between nodes so this will be constructed as a multi-graph and include important information about teams and each match.

Each node represents a team and will be encoded with the team number and other attributes, such as the competitions that were competed in or the number of awards won.

Each edge will be encoded with match information, such as if teams were alliance partners or opponents, qualification or elimination matches, and the event it occurred at.

3 Analysis

From these graphs various centrality metrics and graph properties for different match attributes will be analyzed. Specifically, individual graphs that represent different match characteristics between teams will be created to analyze traditional using traditional methods. Additionally, custom centrality metrics (and more complicated diameter/cutset calculations) will be used to analyze each year with more metrics that easier to compare.

[1] 2020/2021 could be analyzed as well (perhaps in the future), but this dual-year season will always be weird with only 2 weeks of in-person official events before being canceled