Actionable Analytics for the Duke Women's Soccer Team

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Overview

With the goal of providing quantitative insights for the Duke Women's Soccer team, we built numerous tools to visualize and quantify player and team performance. Our work culminated in a dashboard containing all the analysis tools which will be available to the coaching staff and players. Below is a sample pre-match and post-match report highlighting the different analyses we developed.

Pre-Match Report

Duke vs West Virginia Mountaineers on 8/17/2023

West Virginia's Previous 5 Matches

| Date Played	Location	Opposition	Final Score	Final xG	Result
2022-11-18	Away	Penn State Nittany Lion	0-4	0.92-2.75	Loss
2022-11-13	Home	Virginia Tech Hokies	2-0	3.91-0.79	Win
2022-11-06	Away	TCU Frogs	0-0	0.36-1.26	Tie
2022-11-03	Away	University Of Texas	1-0	0.58-0.82	Win
2022-10-30	Away	Oklahoma State Cowgirls	2-1	1.2-0.14	Win

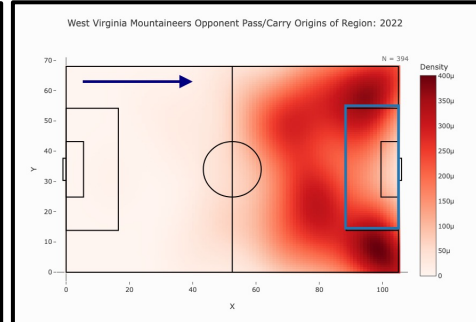#### Offensive Performance
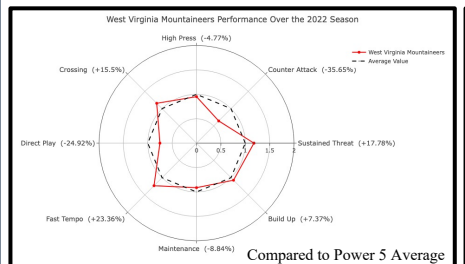
Defensive Performance
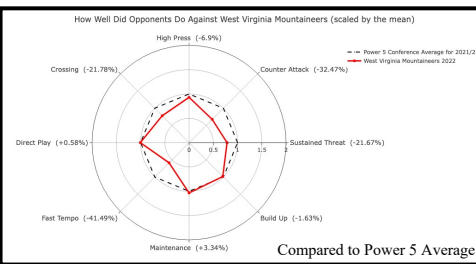
Attacking Service into 18-yard Box
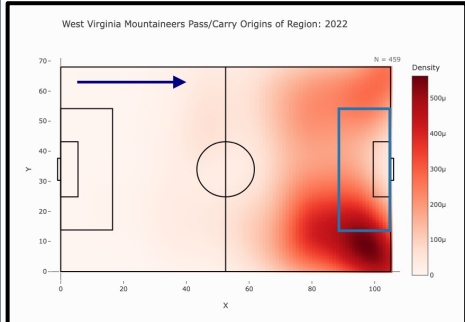
Conceded Service into 18-yard Box

Most Similar ACC Teams

| Team Name	Conf	Similarity
Louisville Cardinals	ACC	Extremely Similar
Virginia Tech Hokies	ACC	Extremely Similar
Clemson Tigers	ACC	Fairly Similar

Most Influential Metrics:
- Successful passes to final third
- Touches in box
- Aerial duels won
- Counterpressing recoveries
- Successful defensive duels

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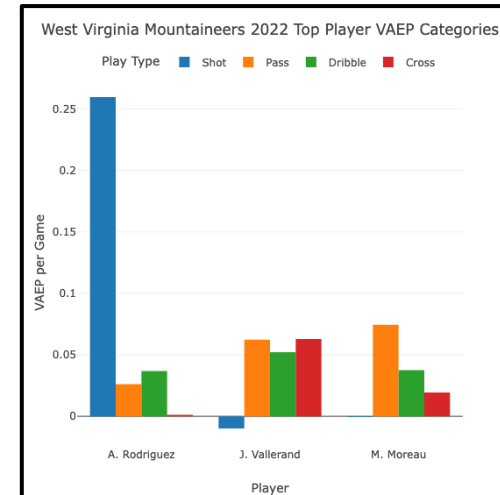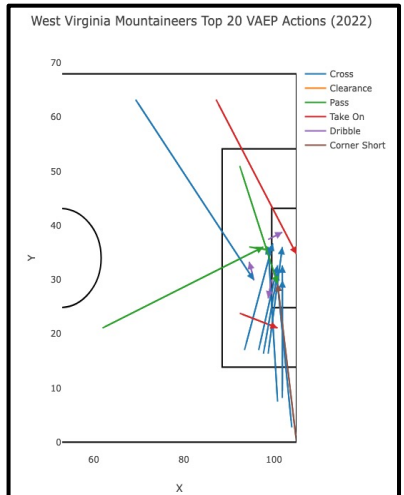### Duke vs West Virginia Mountaineers on 8/17/2023

xThreat
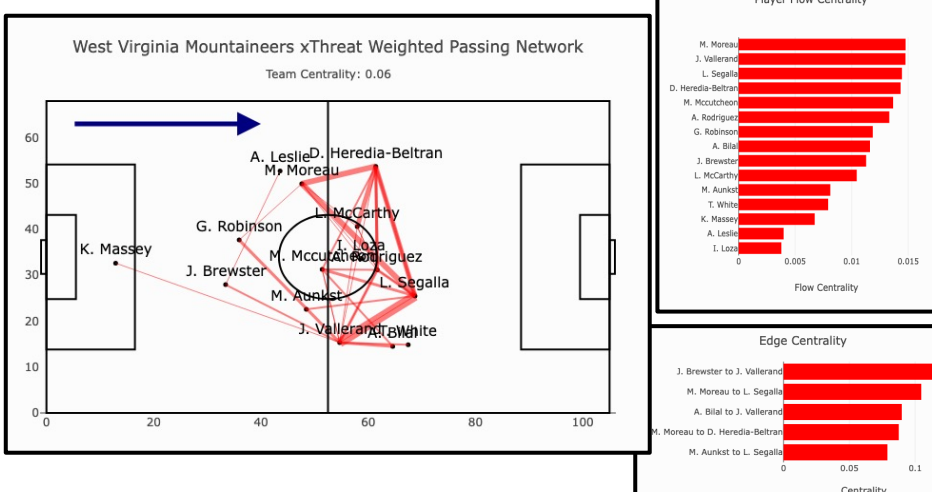
xThreat: quantifies how effectively an action progresses the ball

VAEP Models

Top 3 Players' VAEP Actions

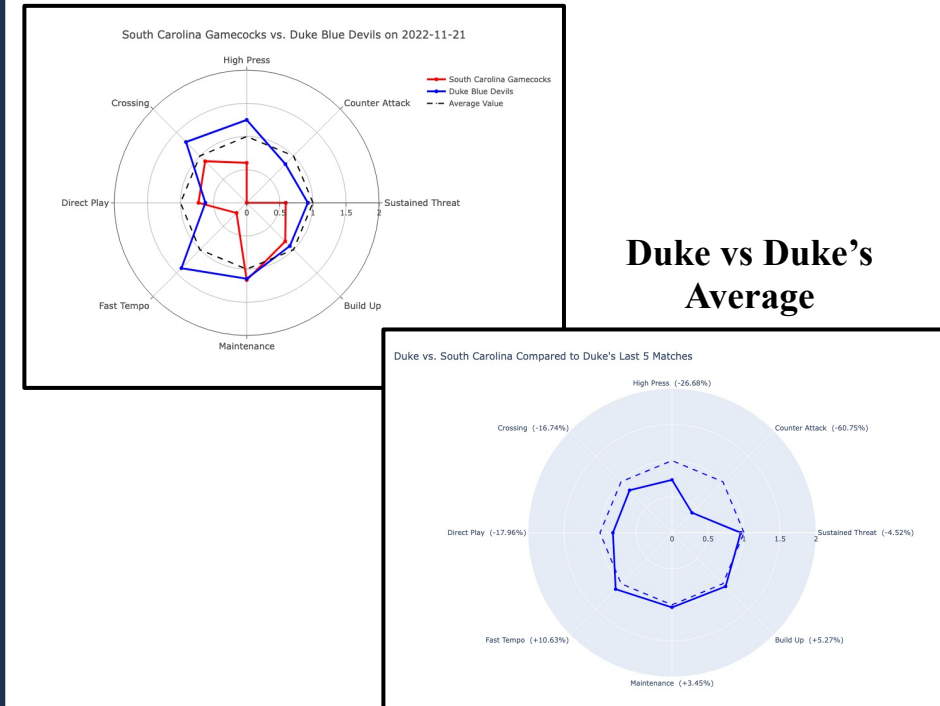##### Team's Top VAEP Actions

VAEP (Valuing Actions by Estimating Probabilities): value assigned based on how much an action increases the chance of scoring and decreases the chance of conceding within the next three actions
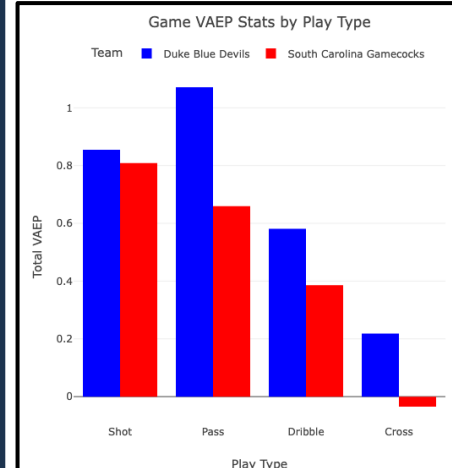
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Post-Match Report

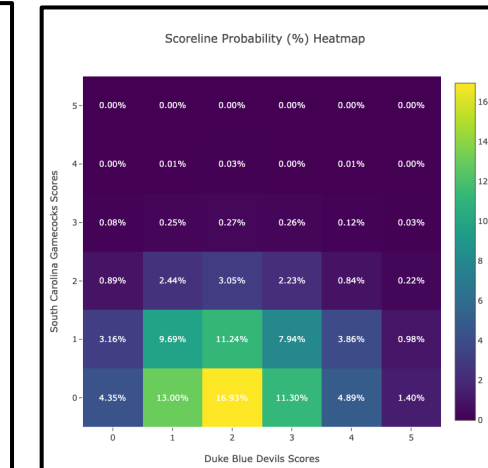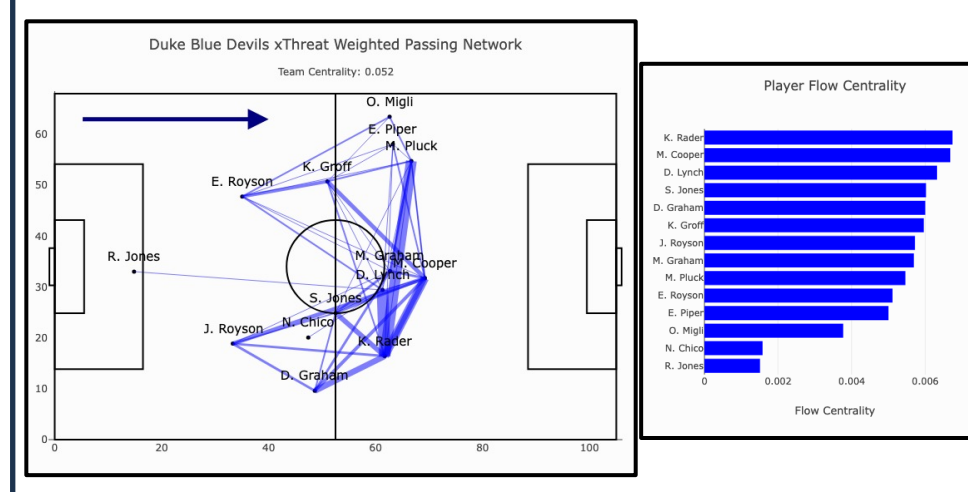### Duke vs South Carolina Gamecocks on 11/21/2022

Game Plot

Duke vs Duke's Average

Game VAEP Stats

Match Simulation

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Duke vs South Carolina Gamecocks on 11/21/2022

xThreat

VAEP Models

Duke VAEP Actions
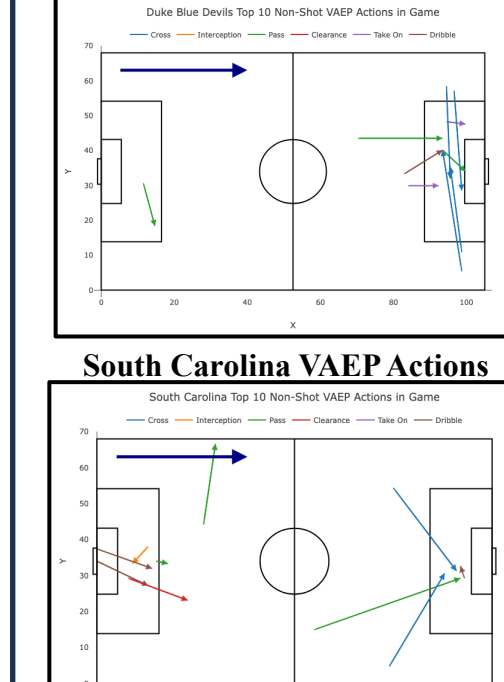
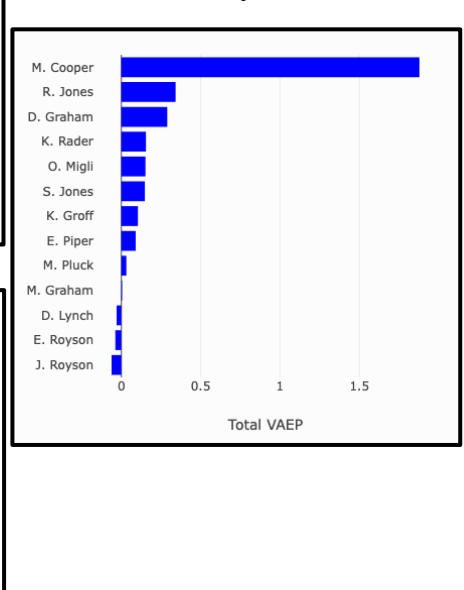##### Duke Player VAEP

South Carolina VAEP Actions
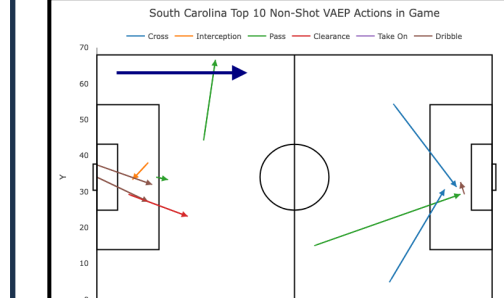
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Radar Plots

Collaborating with the coaching staff, we developed and collected metrics to quantify team playing styles, which are visualized in a radar plot. From this, we conclude that West Virginia played faster compared to the average Power 5 team during the 2022 season but had fewer counter attacks. We extended this tool to our post-game analysis to visualize how both teams performed compared to the average and how Duke performed compared to Duke's average. For example, South Carolina had a low number of fast tempo actions.

PCA

After collecting and feature engineering a variety of team stats over the 2022 season, we ran Principal Component Analysis to reduce the features and generate an interpretable comparison between teams. Based on the principal components, West Virginia's playing style in 2022 was most similar to that of Louisville and Virginia Tech. Some of the ways they are similar include passes to the final third, touches in the box, and successful duels.

VAEP

VAEP (Valuing Actions by Estimating Probabilities) quantifies how an action changes the net goal difference within the next three plays. The pre-match report illustrates that Rodriguez is a dangerous finisher whereas Vallerand creates opportunities with both her crossing and passing. The player VAEP visual in the post-match report reveals that Cooper was the most impactful player in the South Carolina game. We can also use VAEP to see how teams attack and defend.

xThreat

We can display the most dangerous player connections using a passing network weighted by xThreat. The flow centrality chart illustrates how much of the team's xThreat an individual player is responsible for, using an electrical current model to quantify important nodes. This demonstrates that Moreau and Vallerand are central to West Virginia's attack.

Data+