

# Predicting the Outcomes of March Madness Games

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# Objectives and Methodology

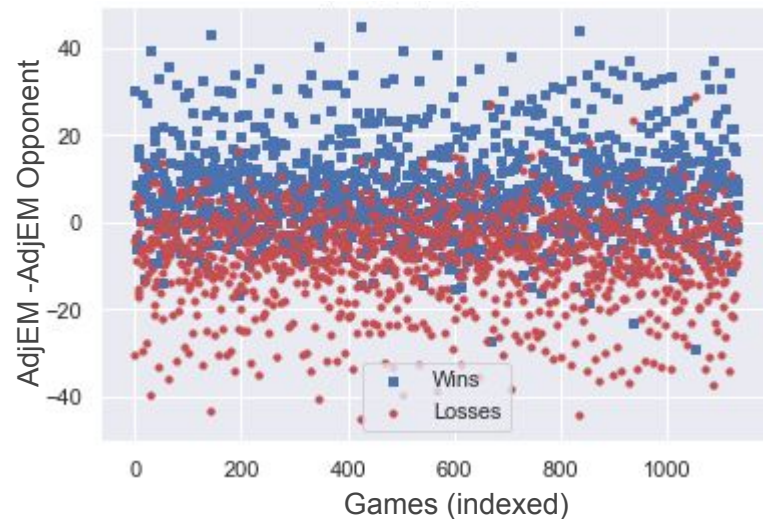
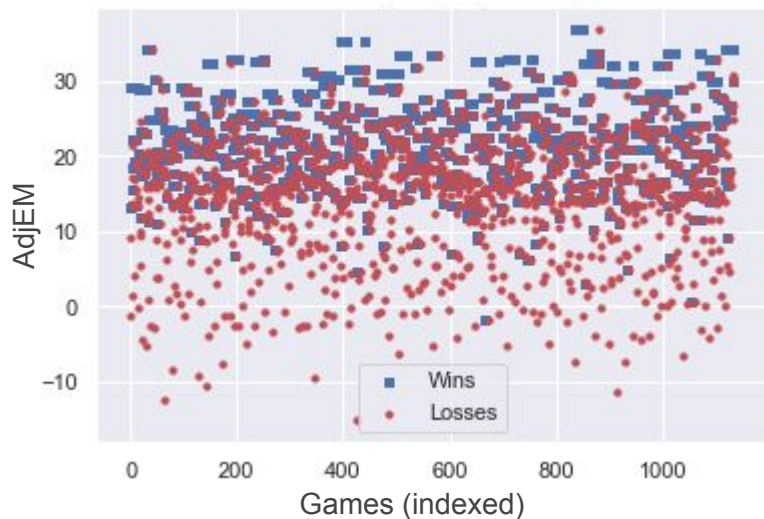
## Objective

- Predict individual outcomes of march madness games
  - Final SVM model predicts game outcomes with 86% accuracy

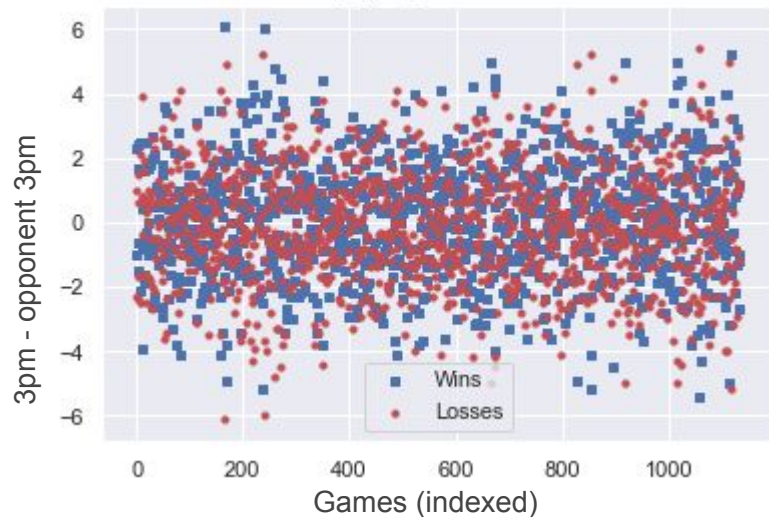
## Methodology

- Data sources
  - Sports Reference - historical brackets, seeding, advanced stats from regular season
  - ESPN - Stats from regular season
  - Kenpom - Ranking System, wins/losses per team in regular season
- Created multiple dictionaries to merge all data from 2002-2019

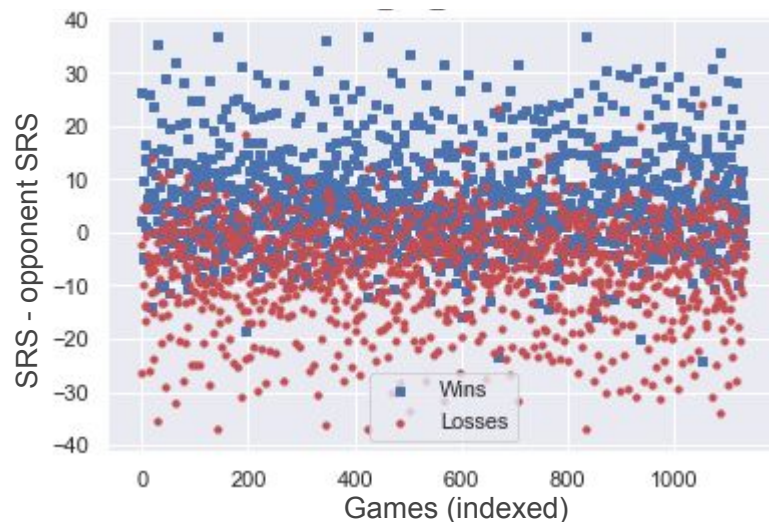
Feature engineering creates larger disparity between wins and losses - allows model to learn better



# Which features are more significant?



vs.



→ Most significant features: Kenpom ratings, wins from regular season, losses from regular season, SOS adv, SRS adv, seeding

# Modeling Data - Trained and Tested on Data From 2002-2019

| Model                            | Accuracy (%) |
|----------------------------------|--------------|
| Decision Tree                    | 75.62        |
| KNN                              | 69.68        |
| Gradient Boosted Regression Tree | 75.62        |
| XGBoost                          | 85.14        |
| Logistic Regression              | 84.43        |
| Support Vector Machine (SVM)     | 86.20        |

\*\*The accuracy is an average of 10 random train test split accuracies

# Experiment: Used SVM model to predict individual game outcomes for 2019 brackets

- Trained and tested data on all data from 2002-2018 (excluded 2019 data)
- Used the model to predict 2019 march madness results

Results 

# Eastern Region

| Rank | Team               | Score | Game                | Score               |
|------|--------------------|-------|---------------------|---------------------|
| 1    | Duke               | 85    |                     |                     |
| 16   | North Dakota State | 62    | at Columbia, SC     | 1 Duke 77           |
| 8    | VCU                | 58    |                     |                     |
| 9    | UCF                | 73    | at Columbia, SC     | 1 Duke 75           |
| 5    | Mississippi State  | 76    |                     |                     |
| 12   | Liberty            | 80    | at San Jose, CA     | 1 Duke 67           |
| 4    | Virginia Tech      | 66    |                     |                     |
| 13   | Saint Louis        | 52    | at San Jose, CA     | 4 Virginia Tech 73  |
| 6    | Maryland           | 79    |                     |                     |
| 11   | Belmont            | 77    | at Jacksonville, FL | 1 Duke 68           |
| 3    | LSU                | 79    |                     |                     |
| 14   | Yale               | 74    | at Jacksonville, FL | 3 LSU 63            |
| 7    | Louisville         | 76    |                     |                     |
| 10   | Minnesota          | 86    | at Des Moines, IA   | 2 Michigan State 80 |
| 2    | Michigan State     | 76    |                     |                     |
| 15   | Bradley            | 65    | at Des Moines, IA   | 2 Michigan State 70 |

# Western Region

|   |                       |                                    |                       |                                    |                |                                 |
|---|-----------------------|------------------------------------|-----------------------|------------------------------------|----------------|---------------------------------|
| 1 <a href="#">Gonzaga</a> 87              |                       | 1 <a href="#">Gonzaga</a> 83       |                       | 1 <a href="#">Gonzaga</a> 72       |                | 1 <a href="#">Gonzaga</a> 69    |
| 16 <a href="#">Fairleigh Dickinson</a> 49 | at Salt Lake City, UT |                                    | at Salt Lake City, UT |                                    | at Anaheim, CA |                                 |
| 8 <a href="#">Syracuse</a> 69             |                       | 9 <a href="#">Baylor</a> 71        |                       |                                    |                |                                 |
| 9 <a href="#">Baylor</a> 78               | at Salt Lake City, UT |                                    |                       |                                    |                |                                 |
| 5 <a href="#">Marquette</a> 64            |                       | 12 <a href="#">Murray State</a> 62 |                       |                                    |                |                                 |
| 12 <a href="#">Murray State</a> 83        | at Hartford, CT       |                                    | at Hartford, CT       | 4 <a href="#">Florida State</a> 58 |                |                                 |
| 4 <a href="#">Florida State</a> 76        |                       | 4 <a href="#">Florida State</a> 90 |                       |                                    |                |                                 |
| 13 <a href="#">Vermont</a> 69             | at Hartford, CT       |                                    |                       |                                    |                |                                 |
| 6 <a href="#">Buffalo</a> 91              |                       | 6 <a href="#">Buffalo</a> 58       |                       |                                    |                |                                 |
| 11 <a href="#">Arizona State</a> 74       | at Tulsa, OK          |                                    | at Tulsa, OK          | 3 <a href="#">Texas Tech</a> 63    |                |                                 |
| 3 <a href="#">Texas Tech</a> 72           |                       | 3 <a href="#">Texas Tech</a> 78    |                       |                                    |                |                                 |
| 14 <a href="#">Northern Kentucky</a> 57   | at Tulsa, OK          |                                    |                       |                                    |                |                                 |
| 7 <a href="#">Nevada</a> 61               |                       | 10 <a href="#">Florida</a> 49      |                       |                                    |                |                                 |
| 10 <a href="#">Florida</a> 70             | at Des Moines, IA     |                                    | at Des Moines, IA     | 2 <a href="#">Michigan</a> 44      |                |                                 |
| 2 <a href="#">Michigan</a> 74             |                       | 2 <a href="#">Michigan</a> 64      |                       |                                    |                |                                 |
| 15 <a href="#">Montana</a> 55             | at Des Moines, IA     |                                    |                       |                                    |                | 3 <a href="#">Texas Tech</a> 75 |



# Midwest Region

| Rank | Team              | Score | Location              | Result |
|------|-------------------|-------|-----------------------|--------|
| 1    | UNC               | 88    | at Columbus, OH       | ✓      |
| 16   | Iona              | 73    |                       | ✓      |
| 8    | Utah State        | 61    | at Columbus, OH       | ✓      |
| 9    | Washington        | 78    |                       | ✓      |
| 5    | Auburn            | 78    |                       | ✓      |
| 12   | New Mexico State  | 77    | at Salt Lake City, UT | ✓      |
| 4    | Kansas            | 87    |                       | ✓      |
| 13   | Northeastern      | 53    | at Salt Lake City, UT | ✓      |
| 6    | Iowa State        | 59    |                       | ✗      |
| 11   | Ohio State        | 62    | at Tulsa, OK          | ✗      |
| 3    | Houston           | 84    |                       | ✓      |
| 14   | Georgia State     | 55    | at Tulsa, OK          | ✓      |
| 7    | Wofford           | 84    |                       | ✓      |
| 10   | Seton Hall        | 68    | at Jacksonville, FL   | ✓      |
| 2    | Kentucky          | 79    |                       | ✓      |
| 15   | Abilene Christian | 44    | at Jacksonville, FL   | ✓      |
| 1    | UNC               | 81    | at Columbus, OH       | ✓      |
| 9    | Washington        | 59    |                       | ✓      |
| 5    | Auburn            | 89    |                       | ✓      |
| 4    | Kansas            | 75    | at Salt Lake City, UT | ✓      |
| 11   | Ohio State        | 59    | at Tulsa, OK          | ✓      |
| 3    | Houston           | 74    |                       | ✓      |
| 7    | Wofford           | 56    |                       | ✓      |
| 2    | Kentucky          | 62    | at Jacksonville, FL   | ✓      |
| 1    | UNC               | 80    | at Kansas City, MO    | ✓      |
| 5    | Auburn            | 97    |                       | ✓      |
| 5    | Auburn            | 77    | at Kansas City, MO    | ✓      |
| 3    | Houston           | 58    |                       | ✓      |
| 2    | Kentucky          | 62    | at Kansas City, MO    | ✓      |
| 2    | Kentucky          | 71    |                       | ✓      |

# Southern Region

| Rank | Team         | Score | Game              | Score |
|------|--------------|-------|-------------------|-------|
| 1    | Virginia     | 71    | at Columbia, SC   | 63    |
| 16   | Gardner-Webb | 56    |                   |       |
| 8    | Ole Miss     | 72    | at Columbia, SC   | 51    |
| 9    | Oklahoma     | 95    |                   |       |
| 5    | Wisconsin    | 54    | at Louisville, KY | 53    |
| 12   | Oregon       | 72    |                   |       |
| 4    | Kansas State | 64    | at Louisville, KY | 80    |
| 13   | UC-Irvine    | 70    |                   |       |
| 6    | Villanova    | 61    | at Louisville, KY | 49    |
| 11   | Saint Mary's | 57    |                   |       |
| 3    | Purdue       | 61    | at Louisville, KY | 99    |
| 14   | Old Dominion | 48    |                   |       |
| 7    | Cincinnati   | 72    | at Louisville, KY | 75    |
| 10   | Iowa         | 79    |                   |       |
| 2    | Tennessee    | 77    | at Louisville, KY | 94    |
| 15   | Colgate      | 70    |                   |       |
| 1    | Virginia     | 63    | at Louisville, KY | 53    |
| 9    | Oklahoma     | 51    |                   |       |
| 12   | Oregon       | 73    | at Louisville, KY | 49    |
| 13   | UC-Irvine    | 54    |                   |       |
| 6    | Villanova    | 61    | at Louisville, KY | 80    |
| 3    | Purdue       | 87    |                   |       |
| 10   | Iowa         | 77    | at Louisville, KY | 75    |
| 2    | Tennessee    | 83    | at Louisville, KY | 94    |

# Final 4

1 [Virginia](#) [63](#)

5 [Auburn](#) [62](#)

3 [Texas Tech](#) [61](#)

2 [Michigan State](#) [51](#)



at Minneapolis, MN

at Minneapolis, MN



1 [Virginia](#) [85](#)



at Minneapolis, MN

3 [Texas Tech](#) [77](#)

1 [Virginia](#)

# Conclusions

- Can predict individual march madness games with 86% accuracy
  - Feature engineering and inclusion of Kenpom stats increased accuracy tremendously

# Future Work

- T-Pot pipeline determined logistic regression coupled with SGDC Classifier produces 90% accuracy
  - Model difficult to interpret - requires investigation
- Incorporate point outcomes of games
- Conduct same experiment as for 2019, but for every year and determine where the model fails the most
- Incorporate more features/engineering