

Choosing the Last Teams In: Top-N Field Construction Versus Fixed Thresholds for At-Large Selection



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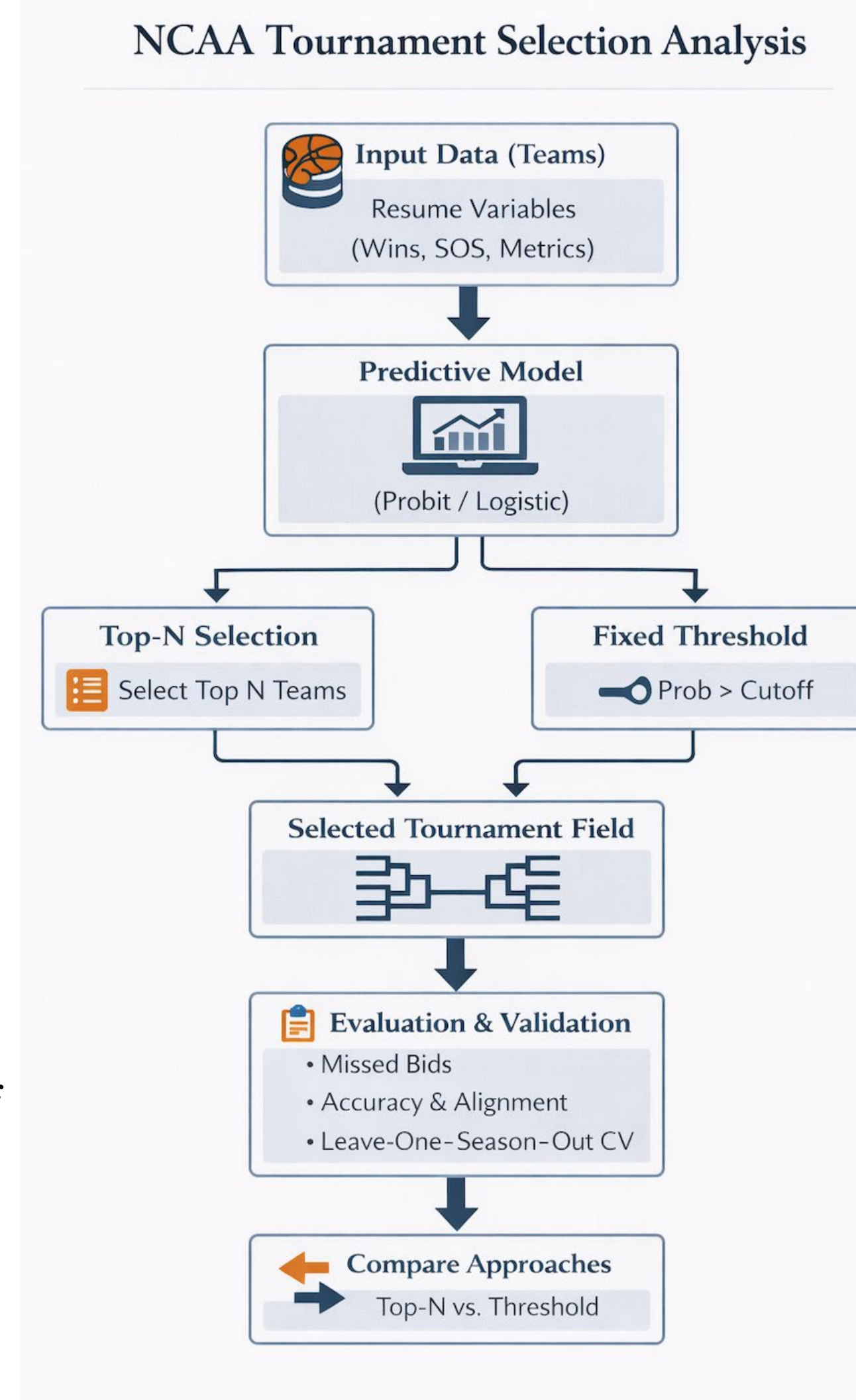


ABSTRACT

This research examines how NCAA at-large tournament teams are selected from predicted probabilities. While many models estimate the likelihood that a team deserves a bid, the final selection depends on how those probabilities are translated into a fixed field of teams. This distinction matters because the tournament requires selecting exactly N teams. Using bubble-focused resume variables, we estimate probabilistic models and compare two selection methods: (1) choosing the top N teams versus (2) applying a fixed probability threshold. Performance is evaluated using leave-one-season-out validation, focusing on missed bids. The goal is to determine which selection rule better reflects real-world committee decisions.

BUSINESS PROBLEM FRAMING TO ANSWER RQ:

Does selecting the top N teams or using a fixed probability threshold produce better at-large selections?



- NCAA tournament models estimate team probabilities but do not always address how to convert them into a fixed selection of teams.
- The goal is to determine which method minimizes missed bids and better reflects real-world committee decisions.
- This problem is important because inaccurate selection can lead to unfair outcomes.
- Stakeholders include the NCAA selection committee, teams on the bubble, analysts, and sports bettors.
- The selection process is constrained by a fixed number of at-large tournament spots.
- The project aims to improve selection accuracy and provide better guidance for translating probabilities into real-world decisions.

DATA

Notable Data Relationship: Better NET rankings lead to higher at-large selection chances, creating a clear team order that supports Top N selection, while fixed probability cutoffs are less reliable near the bubble.

Feature	Description	Role	Priority
Team	Name of College	Used for labeling, holds value	MED; Necessary for differentiation
Conference	Conference associated with team	Helps model account for structural differences	MED; Necessary for differentiation
Overall Seed	Overall placement	Strong predictor of selection probability	HIGH; Determines placement of teams
Bid Type	AQ= Automatic Qualifier AL= At Large, Selected	Defines target outcome of the model	HIGH; Explains how team secured spot
NET Rank	Overall Ranking, including home/away, SOS	Core predictive feature	HIGH; Takes into account multiple variables

METHODOLOGY

This project asks whether selecting the top N teams or using a fixed probability threshold produces better at-large selections of teams.

The goal is to determine which method minimizes missed bids and better reflects real-world selections.

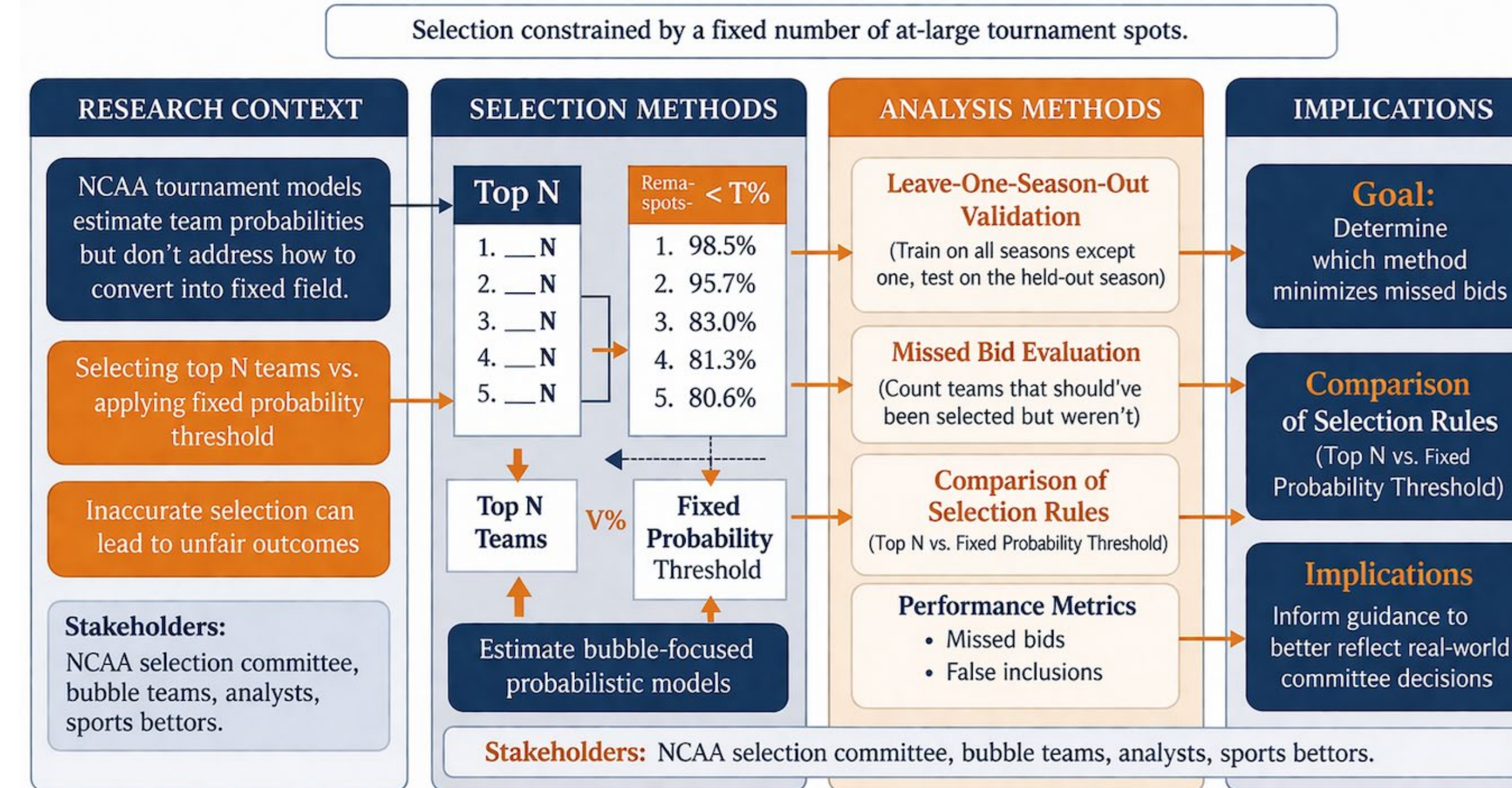


Fig 2. Example Methodology

MODEL BUILDING & EXPERIMENTAL RESULTS

This figure compares how well different variables predict tournament seeding using mean absolute error, where lower values indicate better performance. The results show that NET Rank and PrevNET are the most accurate predictors, while strength-of-schedule metrics perform significantly worse.

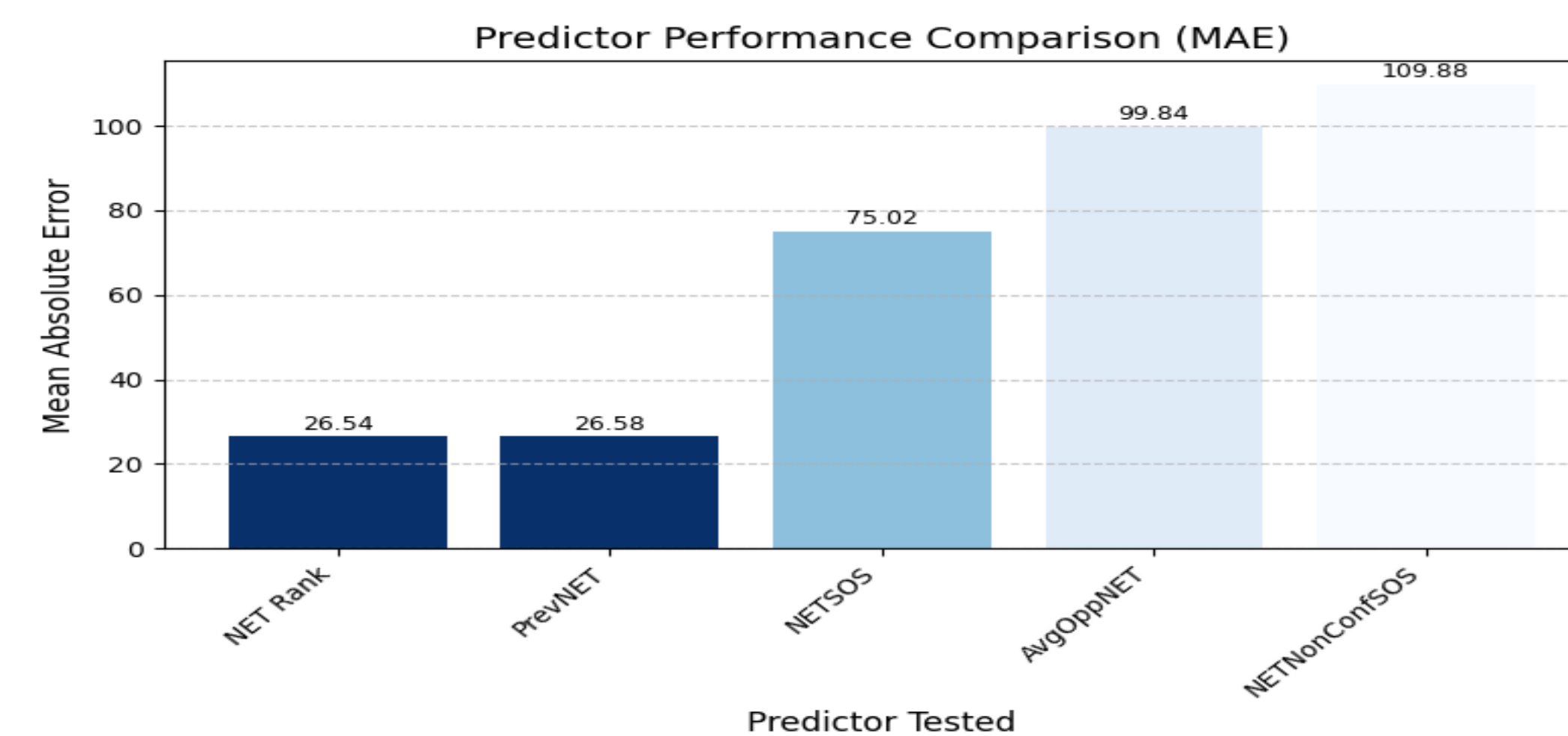


Fig 3. Predictor Performance

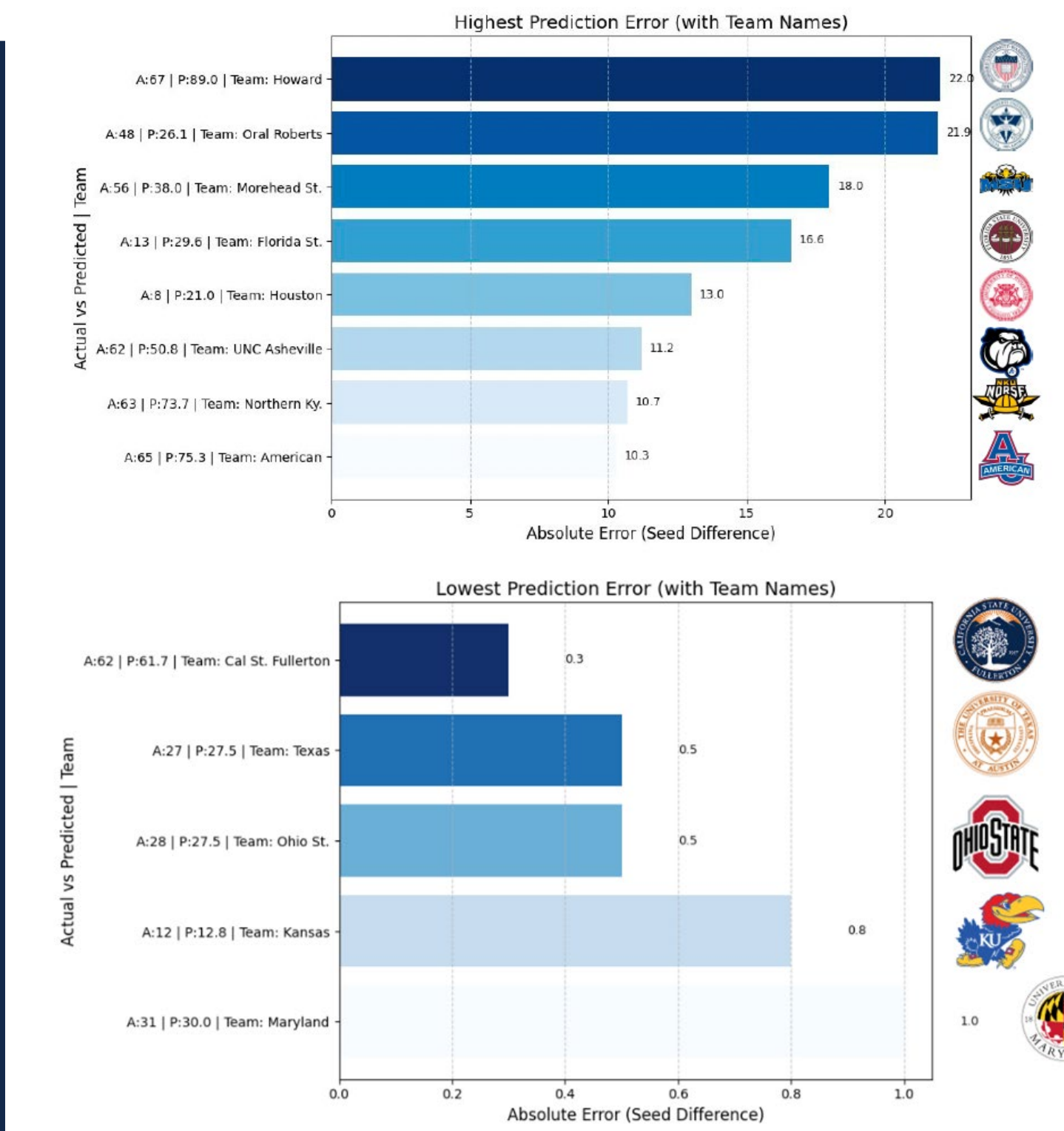


Fig 4. Experimental Results

DEPLOYMENT & LIFECYCLE MANAGEMENT

Rather than using a fixed probability cutoff, selecting the top N teams better reflects the constraint of a limited number of at-large bids. The results show many small prediction errors, suggesting the model captures key résumé factors used by the committee, though some larger errors indicate where contextual factors may matter. Analysts could use this approach to create more realistic projections, with models retrained each season as new data becomes available.

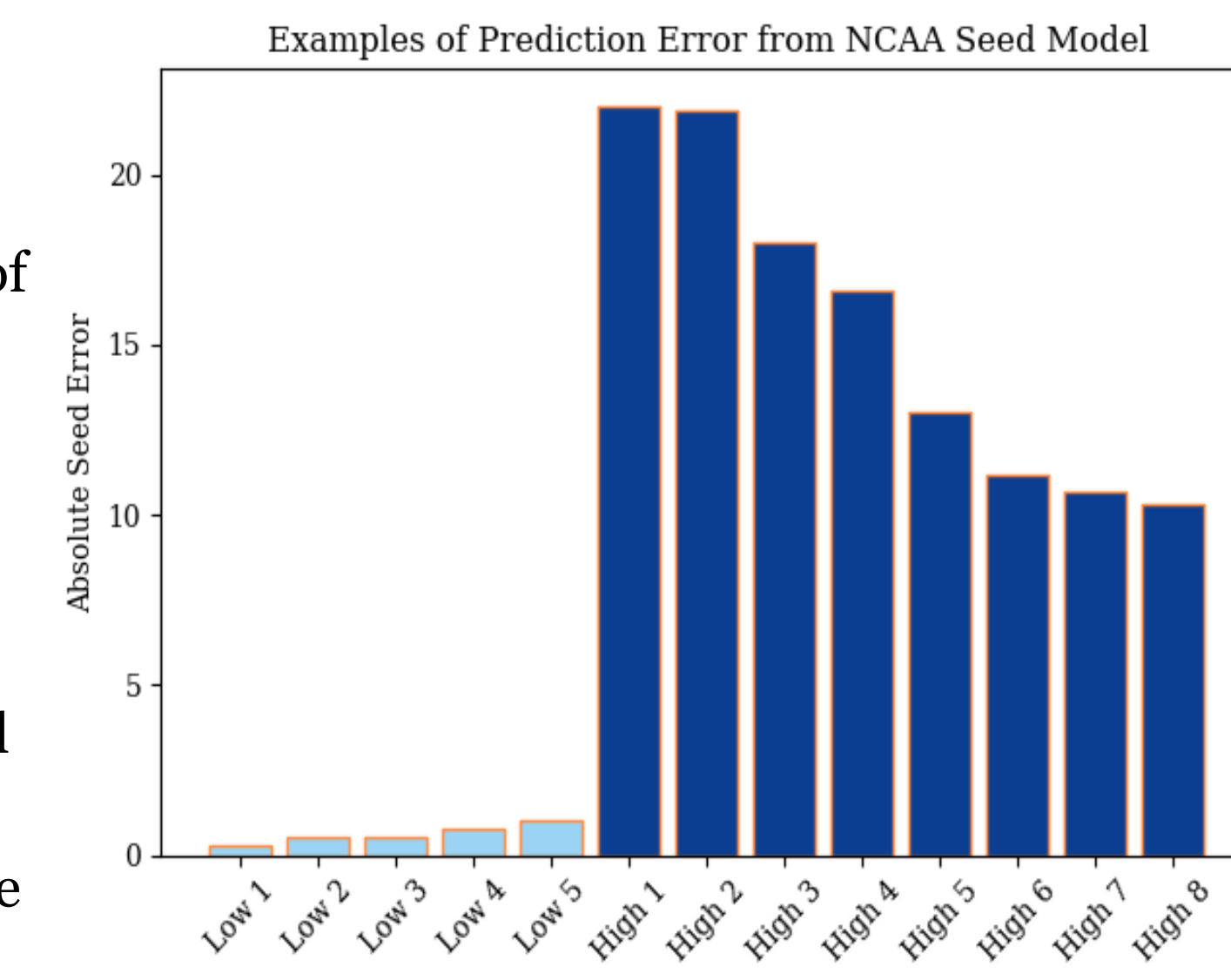


Fig 5. Examples of Lowest and Highest Prediction Errors in the NCAA Selection Model. Light blue bars show accurate predictions, while navy bars highlight cases where the model diverges from actual selections.

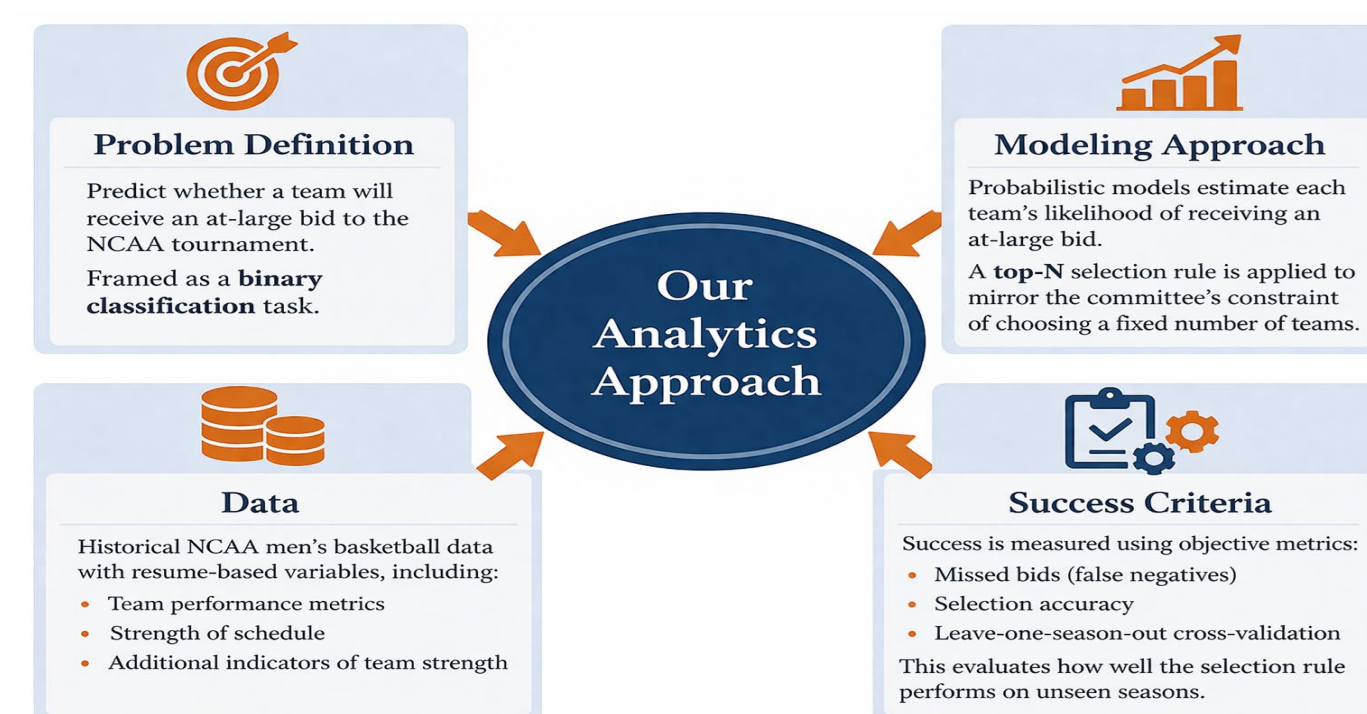
KEY TAKE-AWAYS

- We found that while comparing the predictions with the actual selections the top-N approach had higher accuracy. Of the teams selected, the top-N approach correctly predicted 75.10% of the teams which is higher than the threshold approach which predicted only 69.48% of the teams.
- We found that the top-N rank-based selection rule better respects the constraints of Selection Sunday which confirms that NET resume variables are highly effective at capturing the evaluation of the at-large bubble teams.
- We found that a fixed probability threshold in a constrained selection scenario did not work as it cannot account for structural differences between at-large selection and automatic qualification.
- We placed 68th in the Final Four Analytics Challenge.



ANALYTICS PROBLEM FRAMING

- Binary Classification Task: Predict whether a team receives an NCAA at-large tournament bid using resume-based performance variables.
- Modeling Approach: Probabilistic models estimate each team's likelihood of selection, followed by a top-N selection rule to mirror the committee's fixed number of at-large teams.
- Evaluation: Model performance is assessed using missed bids, selection accuracy, and leave-one-season-out cross-validation to test predictive performance on unseen seasons.



Personal Development & Outcomes

- Applied AI tools to complete a full analytics project
- Learned model-building and data-tracking techniques
- Gained beginner experience in Python and analytics workflows
- Earned a SAS badge while strengthening technical skills
- Improved ability to present analytics in a business-focused way

