

Natural Language Processing and Classification

Using **Subreddit Communities** to
Optimize Engagement with
Consumers

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Problem Statement



Background

Participation in **winter sports** has been rising over the last decade, with a **26% increase** in the active number of snowboarders and skiers.¹ It is only projected to increase, with high consumer values on outdoor activity, experiences, and health. For the first time, the interest in snowboarding has outpaced that of skiing.²

Client and Issue

Burton Snowboards, Inc. is a leader in the winter sports space, but is facing increasing competition in a niche market and among evolving consumer interests and demands.

It is critical that Burton finds way to **expand its customer based and establish consumer loyalty.**



Objective

The objective of this project is to develop a classification model that **predicts the source of a Reddit post** based on its text.

With this, we will **identify opportunities** for Burton that will enhance its market share, generate financial opportunities, and optimize products and marketing.



Methodology & Analysis

- Acquire data via Python Reddit API Wrapper (**PRAW**)
- Conduct **exploratory data analysis**, cleaning, data transformation via Vectorizing
- Build and test various **classification models**
- Evaluate with **accuracy report**





Pre-Processing and Transformation

Baseline Model

Skiers: 51.2%

Snowboarders: 48.8%

RegexTokenizer

My first board. Ready for the upcoming season!!

↓ Tokenize

myfirstboardready

fortheupcomingseason

Text Transformation – CountVectorizer and TfidfVectorizer			
	Board Brand		<div>Burton</div> <div>Burton</div> <div>Avalanche</div> <div>K2</div> <div>Avalanche</div>
		<div>Burton</div> <div>Avalanche</div> <div>K2</div>	<div>Avalanche</div> <div>Burton</div> <div>K2</div>
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Modeling, Tuning, and Testing



Logistic Regression

- **Rationale:** Binary classification, large amount of data for sufficient performance, interpretability
- **Hyperparameters Tested:** C, penalty
- **Precision Outcome:** 91.33%

Multinomial Naïve Bayes

- **Rationale:** Many discrete features (e.g., word counts for text classification), performance with textual data, computational efficiency and scalability
- **Hyperparameters Tested:** Alpha
- **Precision Outcome:** 87.94%

Support Vector Machine

- **Rationale:** High performance for text classification task, ability to handle non-linear relationships, versatility in kernel choices
- **Hyperparameters Tested:** C, kernel, degree
- **Precision Outcome:** 91.95%



Modeling, Tuning, and Testing (Cont'd)

Random Forest

- **Rationale:** Reduce overfitting, performance with textual data, capture of feature importances to aid interpretability
- **Hyperparameters Tested:** N_estimators, max_depth
- **Precision Outcome:** Accuracy not high enough, did not continue to calculating precision

Extra Trees

- **Rationale:** Reduce overfitting, extra randomness to further reduce variance, performance with textual data, capture of feature importances, computational efficiency
- **Hyperparameters Tested:** N_estimators, max_depth
- **Precision Outcome:** Accuracy not high enough, did not continue to calculating precision

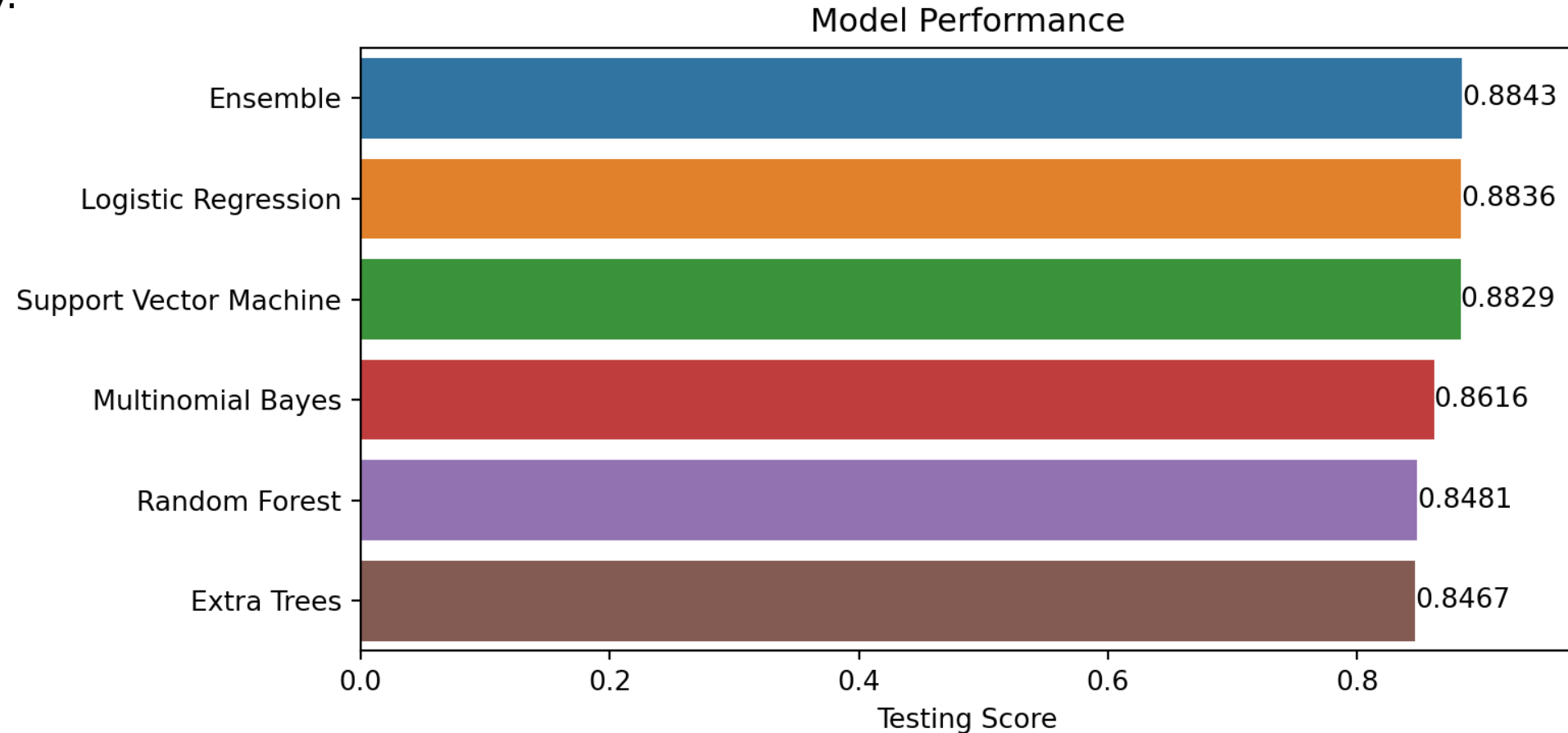
Ensembling

- **Rationale:** Wisdom of the Crowds, improving accuracy by reducing individual model bias, increase robustness by removing outliers and noise,
- **Hyperparameters Tested:** All that were tested during individual model runs
- **Precision Outcome:** Accuracy not high enough, did not continue to calculating precision



Modeling Accuracy and Final Model Selection

Each model outperformed the baseline significantly, but each model performed similarly in terms of accuracy.

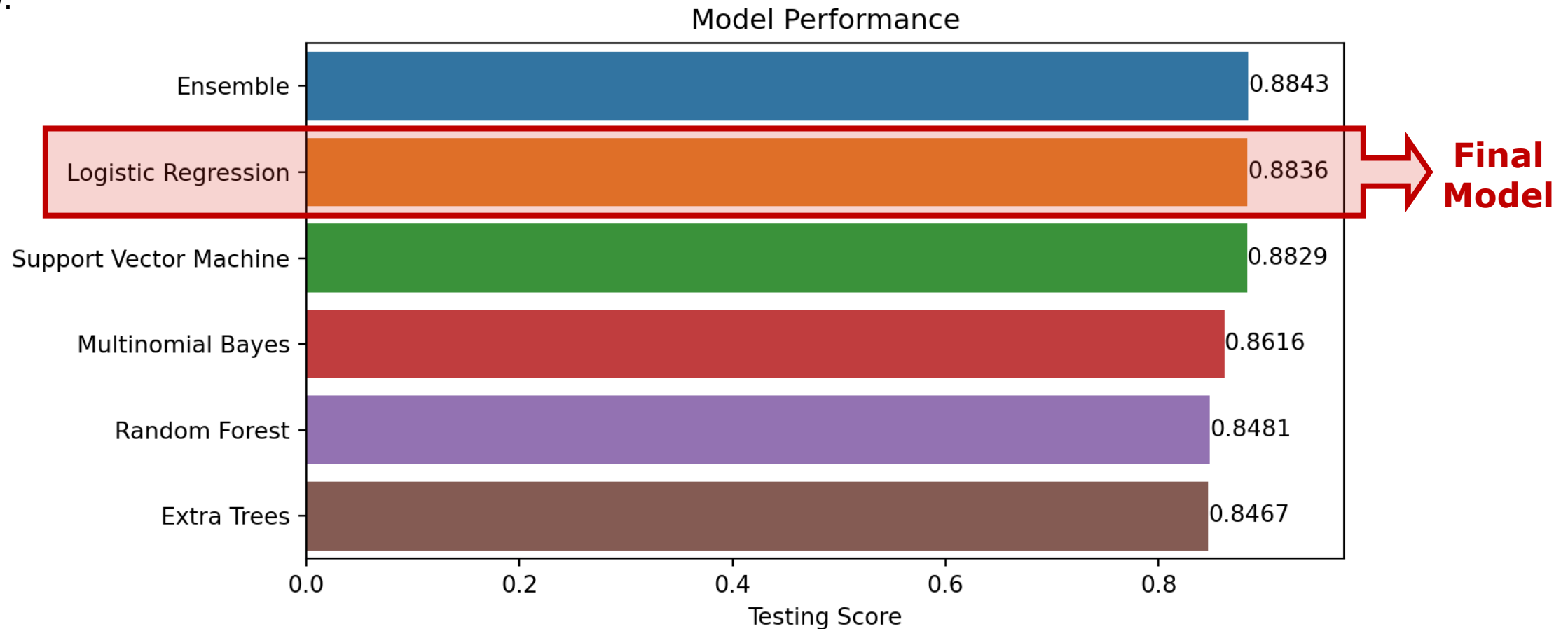


Logistic Regression using TfidfVectorizer transformation was selected to be the final model. While the accuracy was similar to the SVM, we choose the logistic regression for its **simplicity, interpretability, and computational efficiency.**



Modeling Accuracy and Final Model Selection

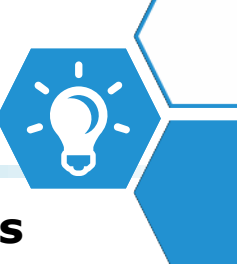
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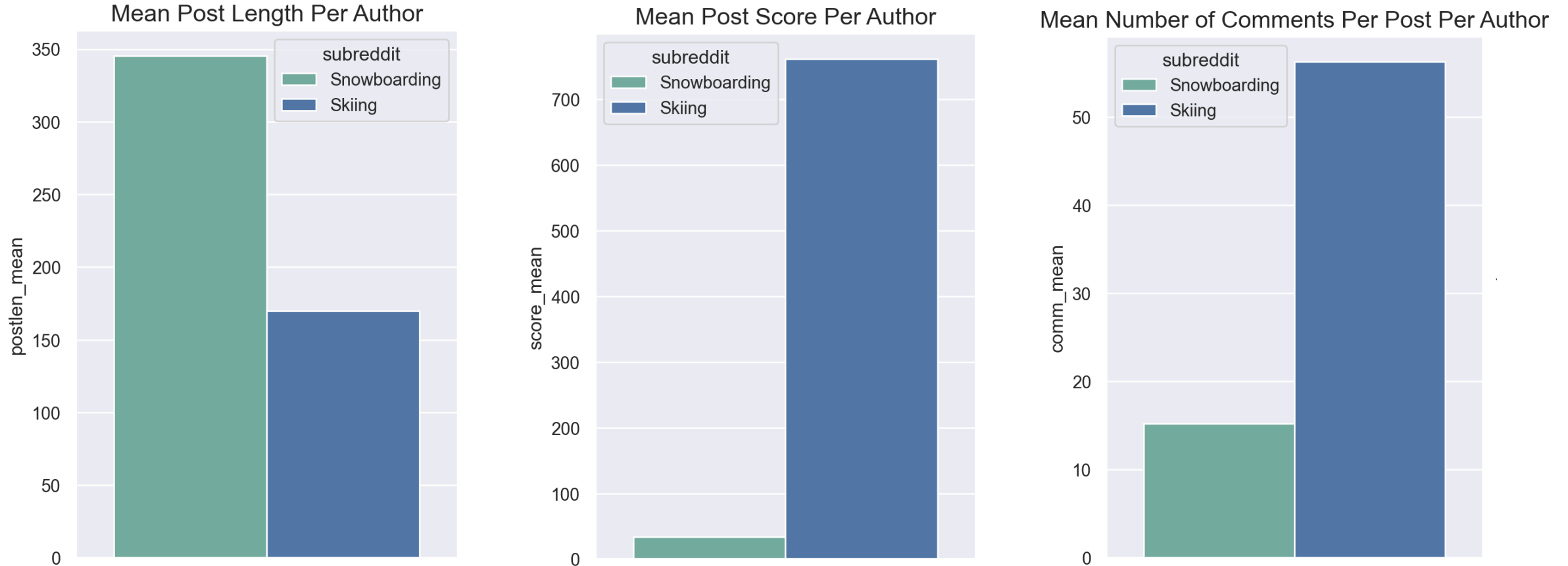
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Determining How to Use Our Model: Leverage EDA



To understand how our model can be leveraged to help Burton Snowboards, we must **leverage insights from our exploratory data analysis**.



Both groups had a very similar number of average posts per author. Snowboarders engaged by posting **longer messages** on average and upvoting fewer messages, whereas skiers engaged by **upvoting more** messages and **commenting more** with each post.



Determining How to Use Our Model: Leverage EDA (Cont'd)



Community Engagement



Snowboarders

Top words among the snowboarding community had more to do with gear, performance, technique, or the experience **in or during** the activity.

boot

Burton

binding

edge

toe

jump

heel

turn

gear

Skiers

Top words among the skiing community aligned more with the experience **around** the activity, such as the best place to go, the best time of year, the best passes to get.

trip

Palisade
Tahoe/
Lake Tahoe

season

Jackson Hole,
Park City,
Winter Park

Epic pass /
Season Pass /
Ikon Pass

best
resort

day

Vail resort

mountain



Summary of Recommendations



Using the insights gained on the subreddit communities, we can now put our model to use in the most effective way possible.

Outreach to Snowboarding Members ...

Implement digital transformation efforts to increase E-commerce and direct-to-consumer business by doing the following:

Recommendation	Area	Action
1	Marketing	Advertise promotional offers and exclusive discounts to the snowboard community for gear and accessories.
2	Partnerships	Partner with professionals and snowboard schools to package lessons and rentals/equipment if bought through Burton.
3	Content Creation	Create and deliver targeted content (video tutorials, blog articles, social media posts) on technical tips and tutorials .



Summary of Recommendations



Using the insights gained on the subreddit communities, we can now put our model to use in the most effective way possible.

Outreach to Skiing Members ...

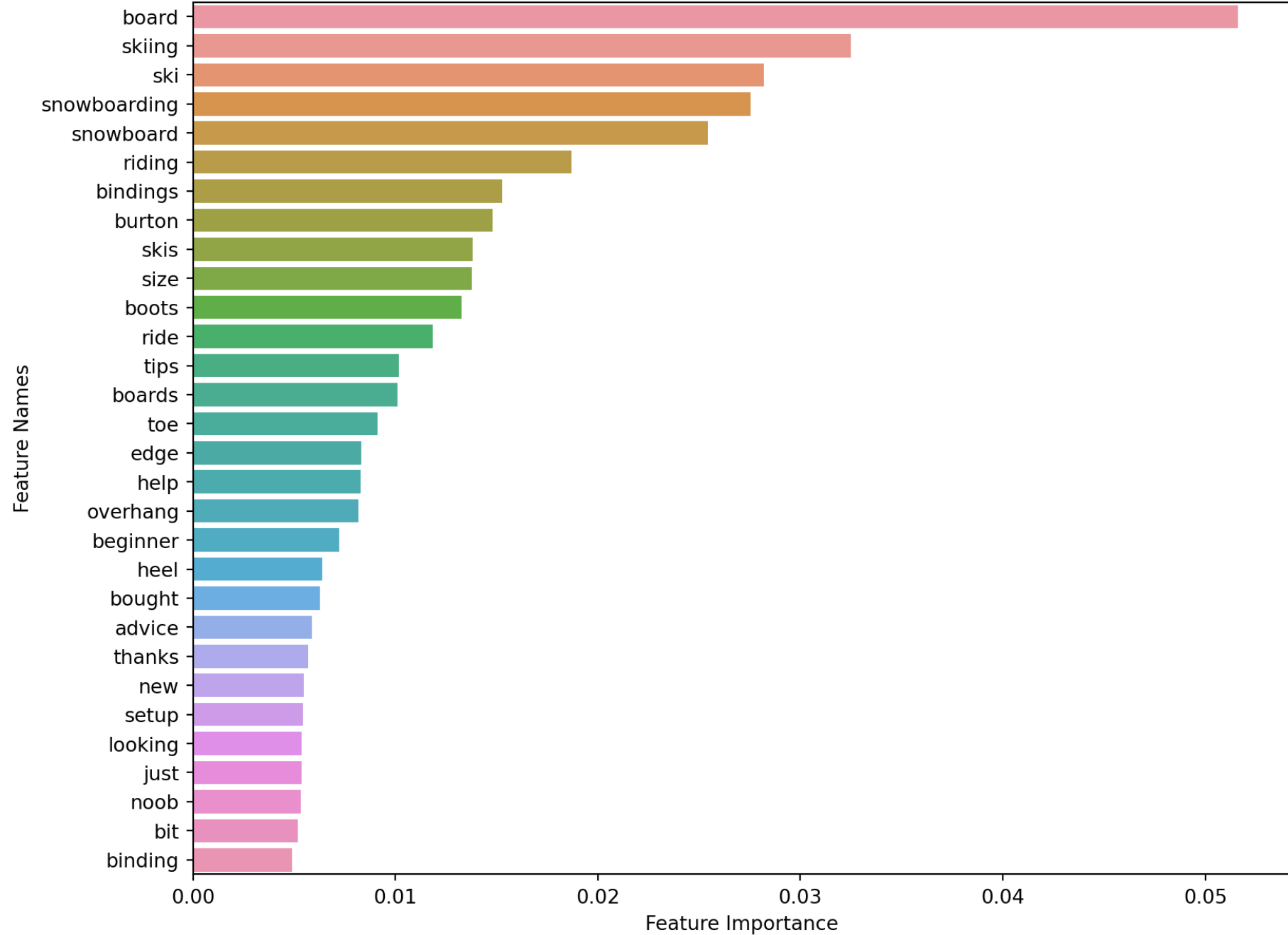
Expand the market share of skiers by advertising Burton's high-performance apparel and appealing to the community's interest in trip-planning.

Recommendation	Area	Action
1	Partnerships	Partner with ski resorts and travel agencies to create exclusive packages that include discounted apparel from Burton. <ul style="list-style-type: none">• Use these partnerships to expand Burton's global reputation
2	Website Promotion	Promote skiing section of Burton's website by directing skiers to special/exclusive apparel and accessory offers
3	Travel / Destination Guides	Develop guides highlighting the best ski resorts or locations for winter activity. Showcase the utility and advantages of Burton products as essential gear.

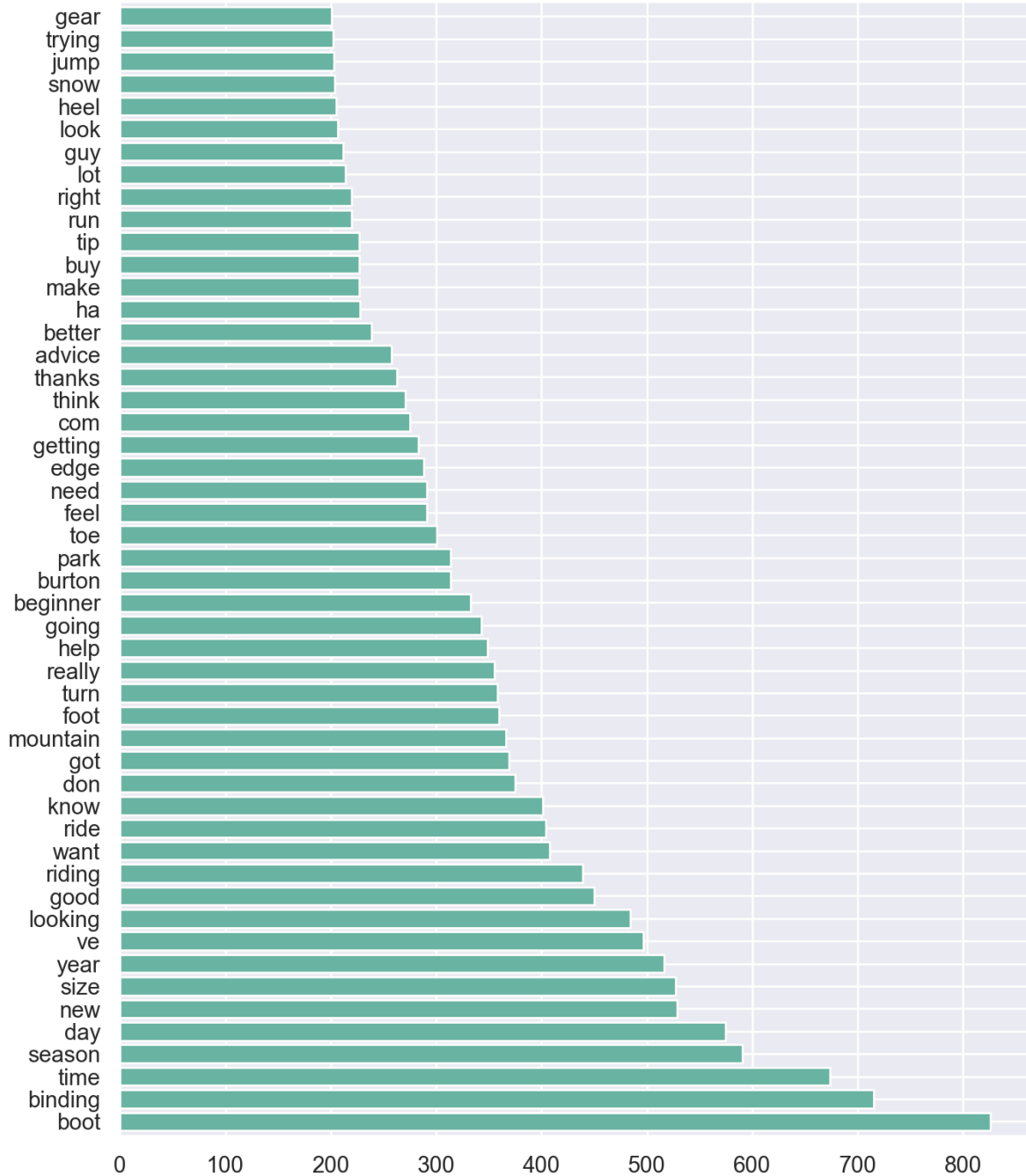
Questions?

Appendix

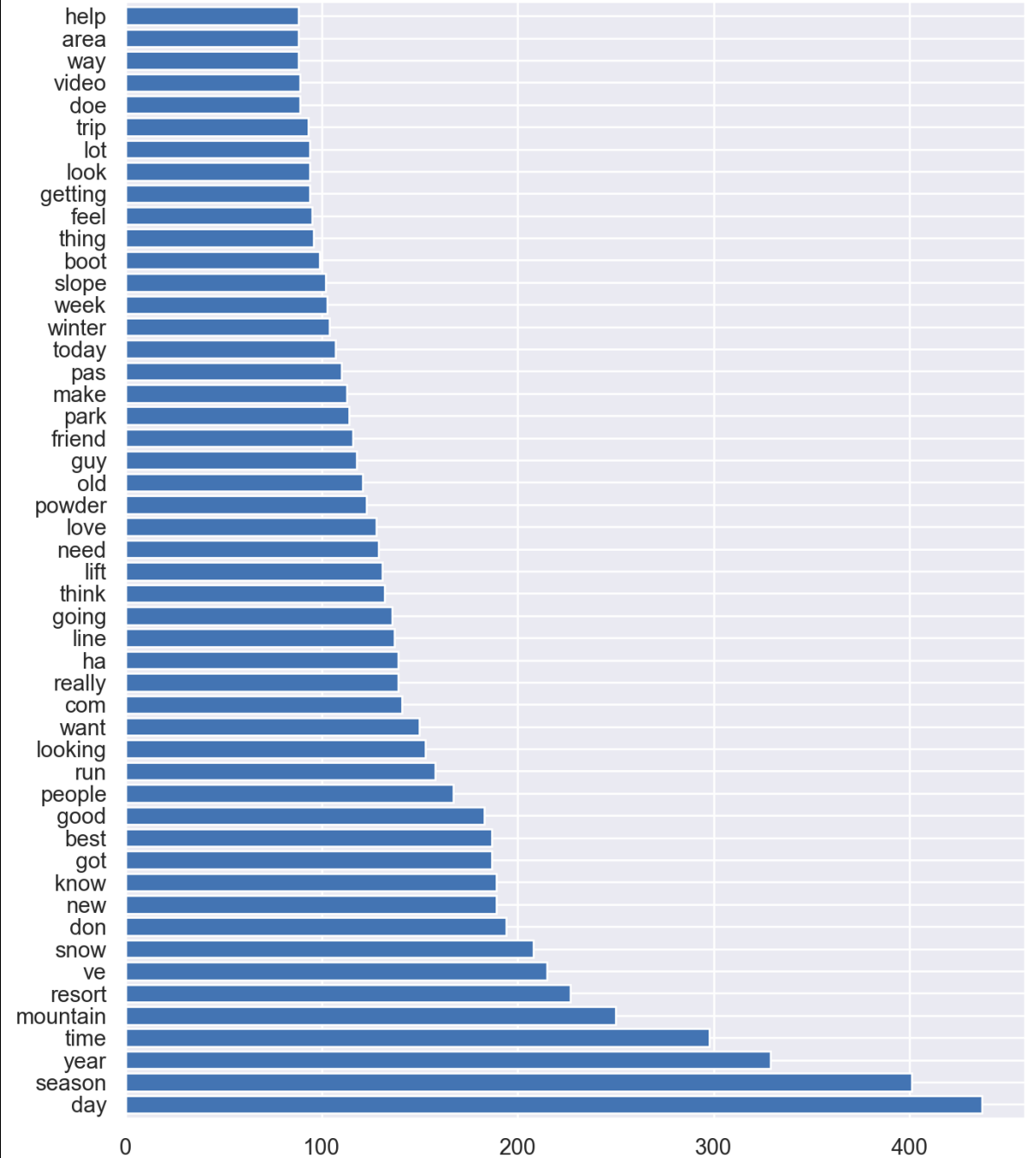
Random Forest Top 30 Feature Importances



Most Common Unigrams Among Snowboard Subreddit



Most Common Unigrams Among Skiing Subreddit



Top 30 Words Used in Snowboarding + Skiing Subreddit Communities

