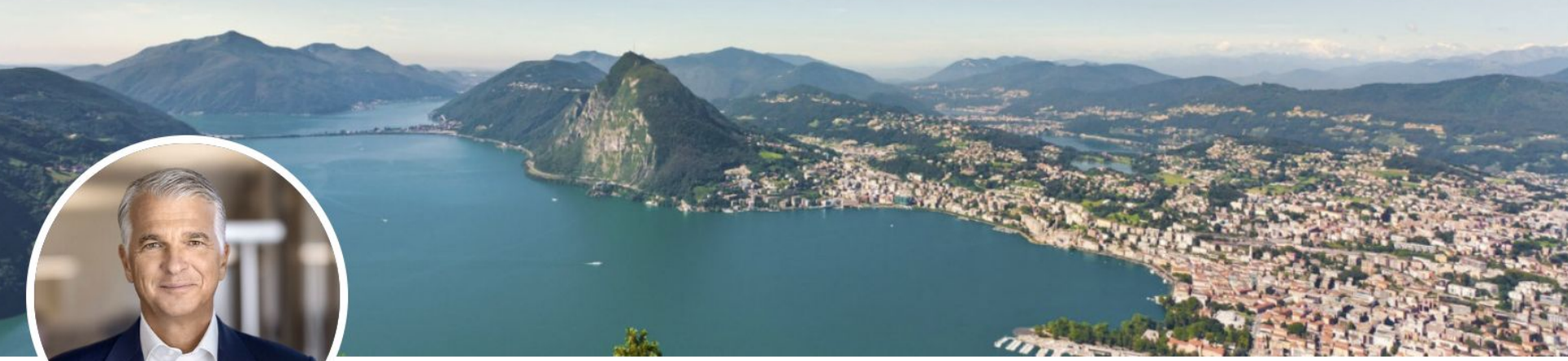
Success Predictor for LinkedIn Posts

Transfer Project
CAS ML 2025 @ HSLU
Reto Lämmler
Zurich, 3.2.2025



Sergio P. Ermotti · 3rd

UBS

Group CEO and President of the Executive Board of UBS AG

Zurich, Zurich, Switzerland · Contact info

307,457 followers

Followed by Yvan, Helmuth and 264 others you know

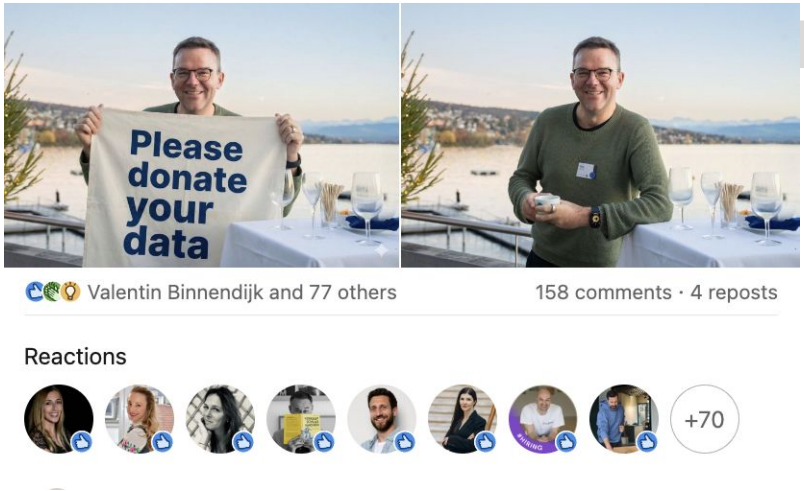
Following | Connect | ...

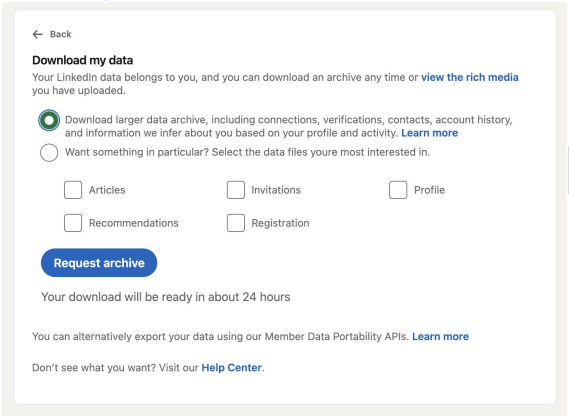

65% DROP IN REACH?
LINKEDIN'S 2025
LinkedIn silently changed its algorithm, and the old strategies just don't work anymore.
Sonu Kushwaha

Goal of Transfer Project

1. Train a **model to predict success** for LinkedIn Posts
2. Understand **what features drive success** and what punishes you
3. Compare impact of features **before vs. after the algorithm change** in 2025

Data Acquisition

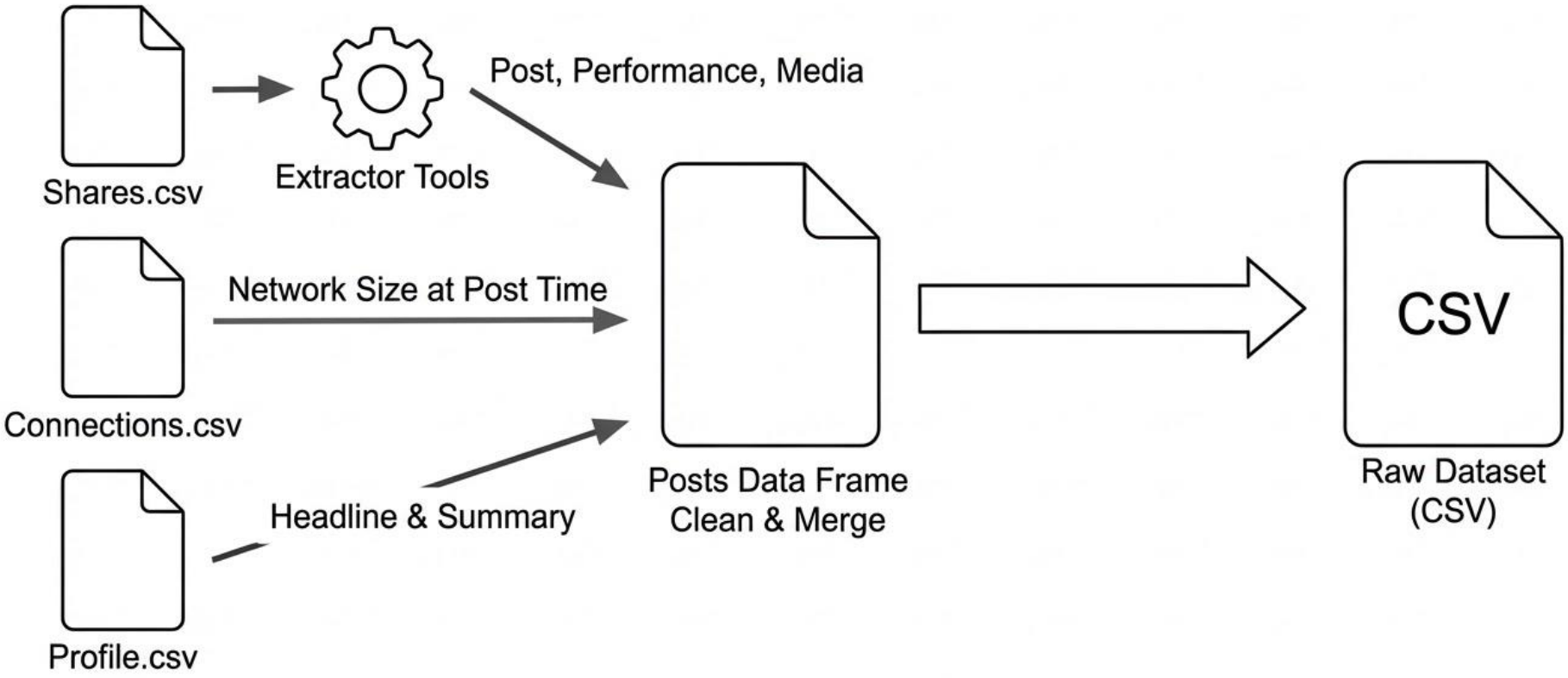




10k posts

from 42 people

Data Preprocessing



Feature Engineering

Post Content Features:

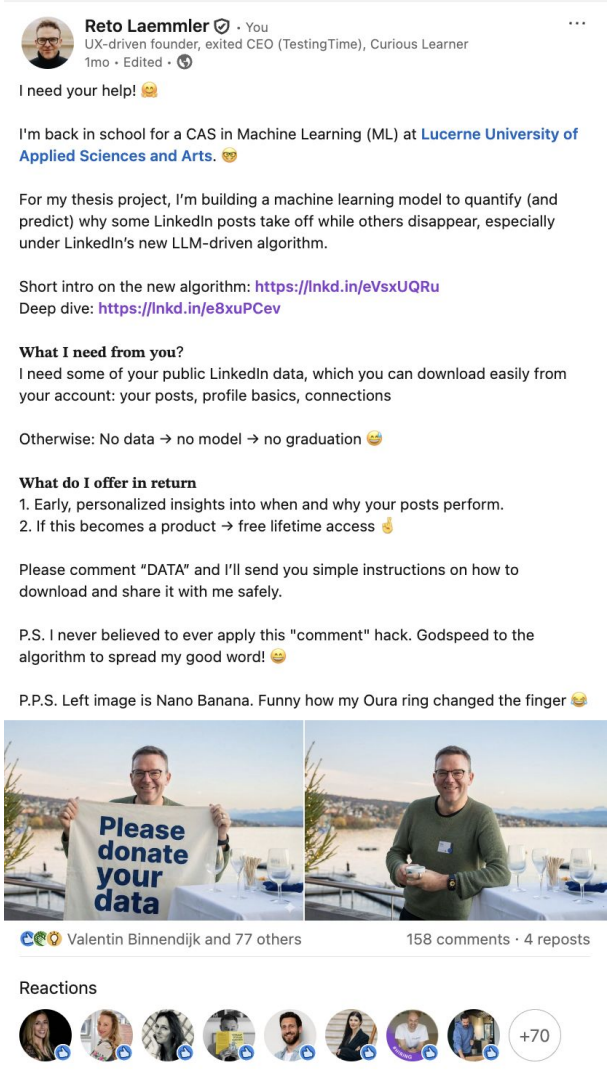
- Post Content Length
- Hook Length
- Linebreak Count
- Emoji Count
- Hashtag Count
- Link Count

Posting Time Features:

- Hour of day (0…23)
- Day of week (0…6)

NLP Features:

- Sentiment Score
  - *nlptown/bert-base-multilingual-uncased-sentiment*
- Semantic Alignment
  - *paraphrase-multilingual-MiniLM-L12-v2*
  - cosine similarity Profile Summary <> Post Content



Target variable

Weighted Relative Engagement Score:

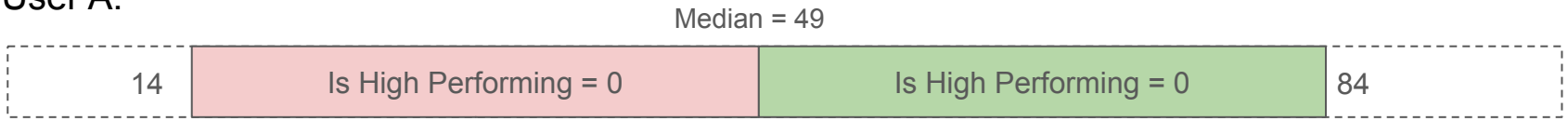
$$S\_rel = ((Likes * 1 + Comments * 3) / Network\ Size) * 1000$$

Binary Classifier:

Is High Performing (0 / 1)

Mapping Engagement Score to “Is High Performing”

User A:



User B:

Why Median per user?

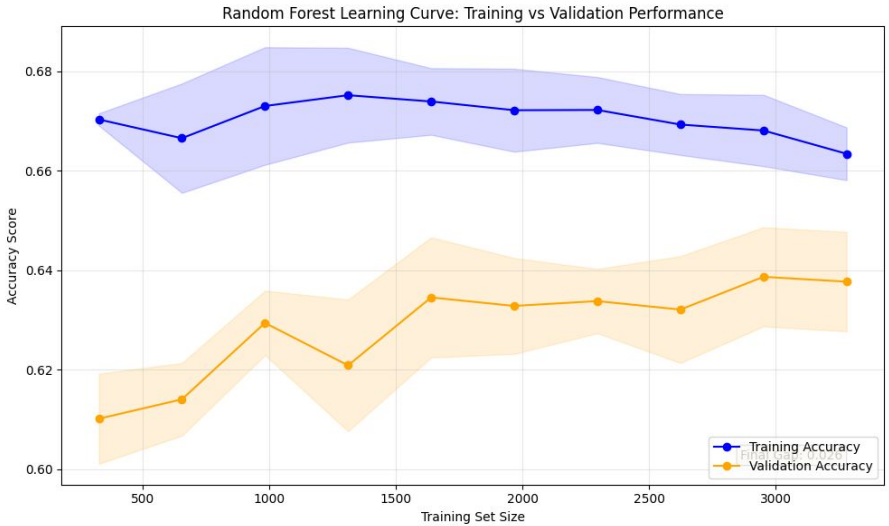
- 50/50 class balance
- Outlier robustness
- Equalize performance
- Mitigating identity bias

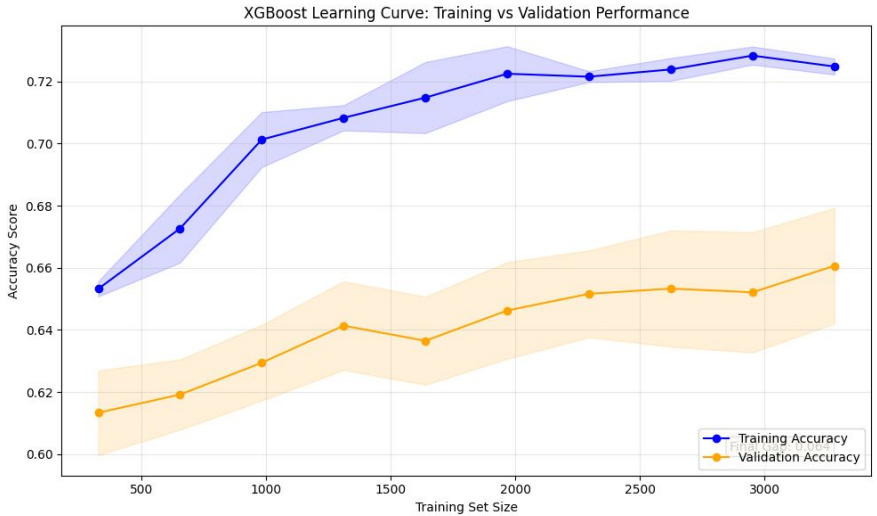
Training Set Balancing

- **User Capping:** A maximum limit of **350 posts per user** was enforced.
- **Outlier Management:** The **Relative Engagement Score** was capped at **150**
- **Min. Content Length:** Content / reposts below **50 characters** were removed.

After the balancing, **5124 posts** were left for training.

Learning Curve: Random Forest vs. XGBoost





Hyperparameter Tuning

Hyperparameter	Random Forest	XGBoost
Number of Estimators	50	700
Max Depth	5	4
Learning Rate	—	0.03
Min Samples Split / Min Child Weight	30	10
Min Samples Leaf	30	—
Max Features / Colsample by Tree	sqrt	0.7
Subsample	—	0.5
L1 Regularization (reg_alpha)	—	1.0
L2 Regularization (reg_lambda)	—	20
Gamma	—	1.0

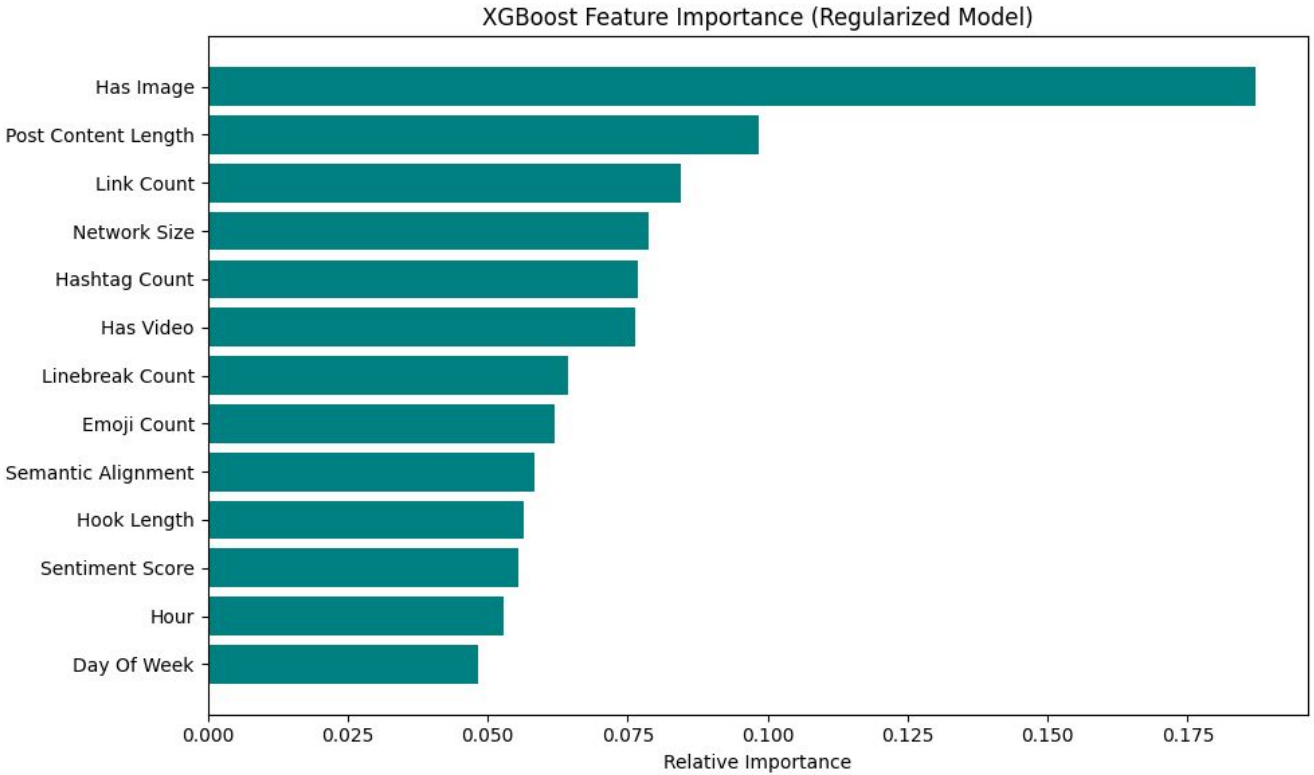
Random Forest:
Tuning reduces overfitting and stabilizes predictions on noisy social-media data.

XGBoost:
Tuning forces the model to learn slowly and robustly, improving generalization.

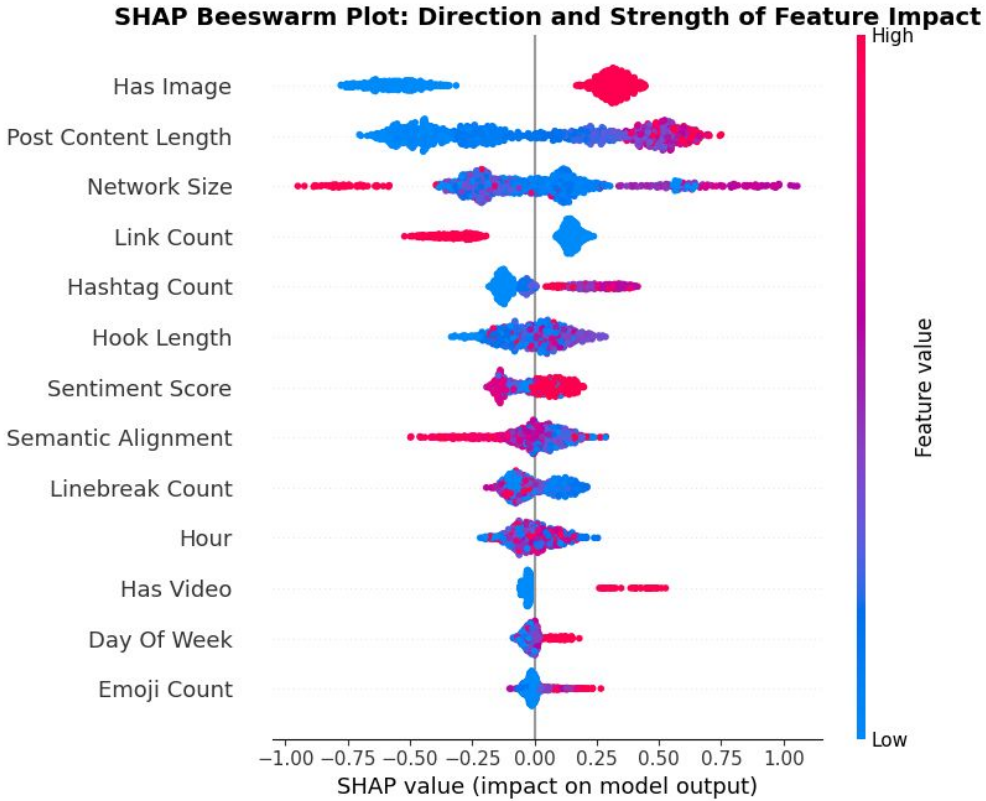
Test Set Performance Comparison

Metric	Random Forest	XGBoost	Difference
Accuracy	0.6585	0.6693	+1.08%
ROC-AUC	0.7193	0.7359	+1.66%
F1-Score	0.6622	0.6744	+1.22%
Precision	0.66	0.67	+1.00%
Recall	0.66	0.67	+1.00%
Val-Test Gap	-0.0179	-0.0115	+35.80%

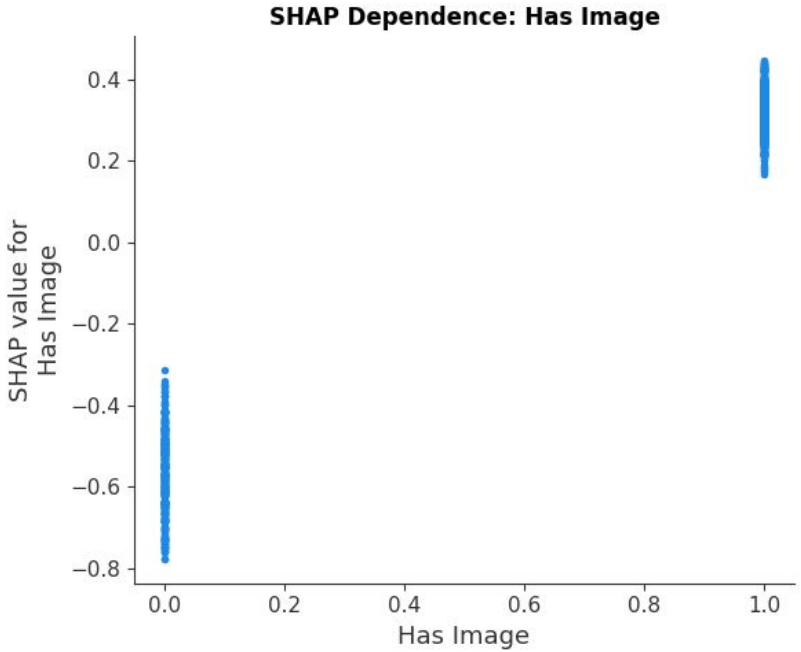
Feature Importance (XGBoost)



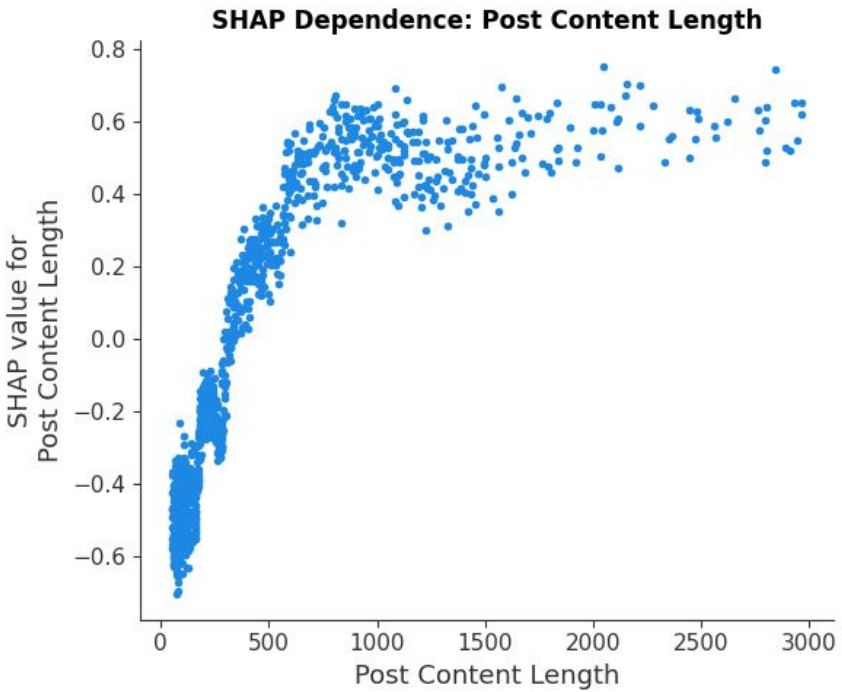
Global SHAP Beeswarm



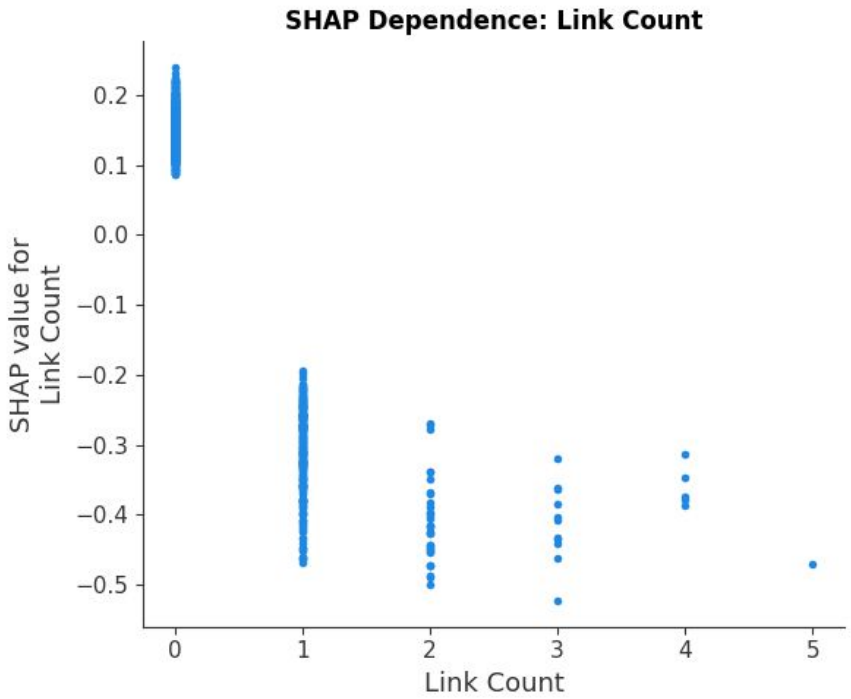
An image is a must have



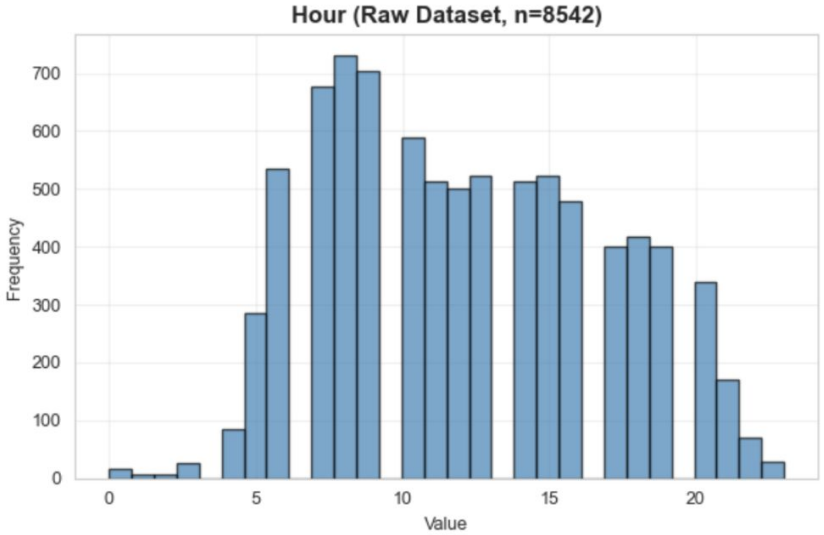
Short content gets penalized

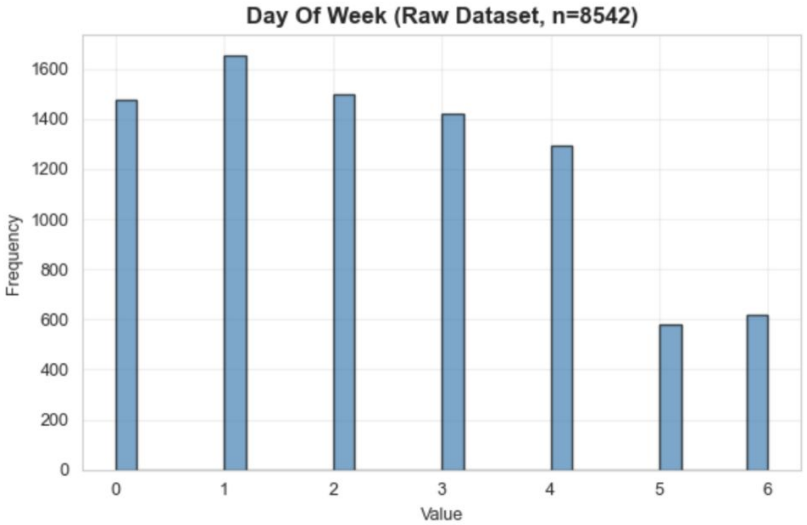


External links in your post are penalized

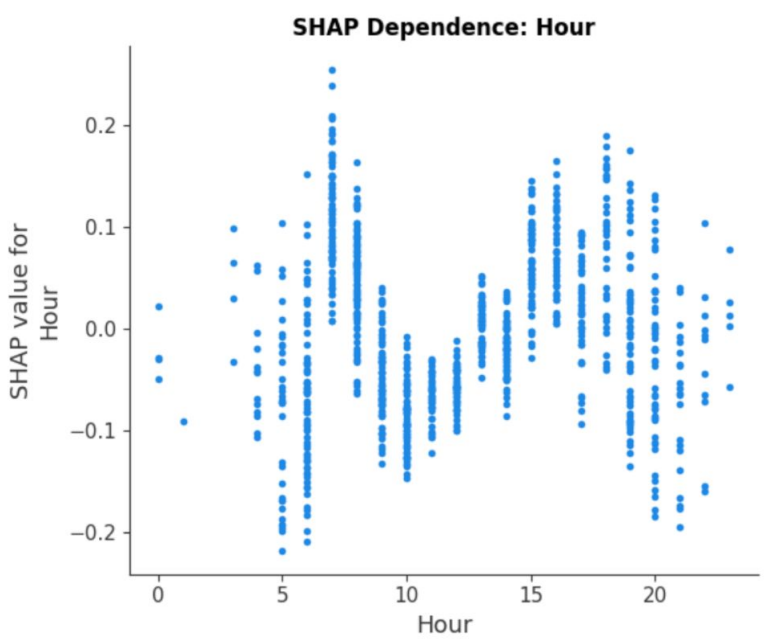


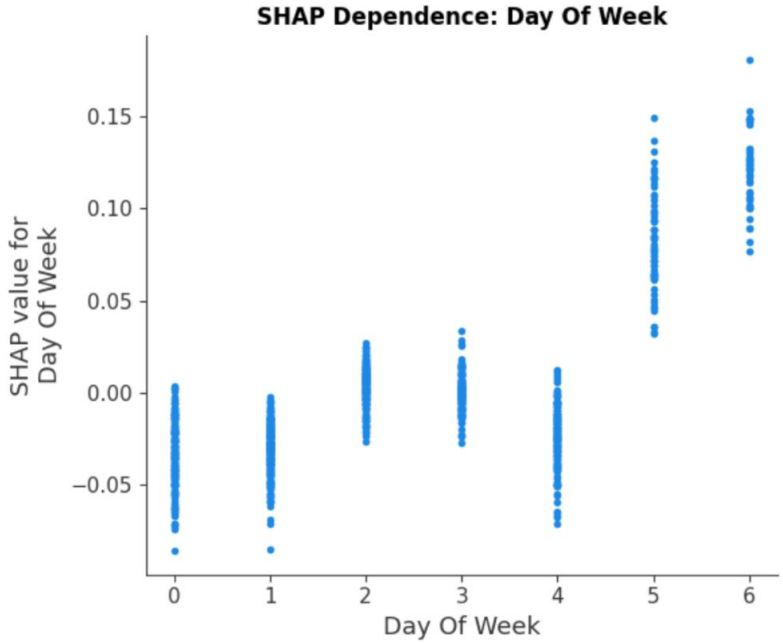
The dataset believes the myth of Tuesday morning



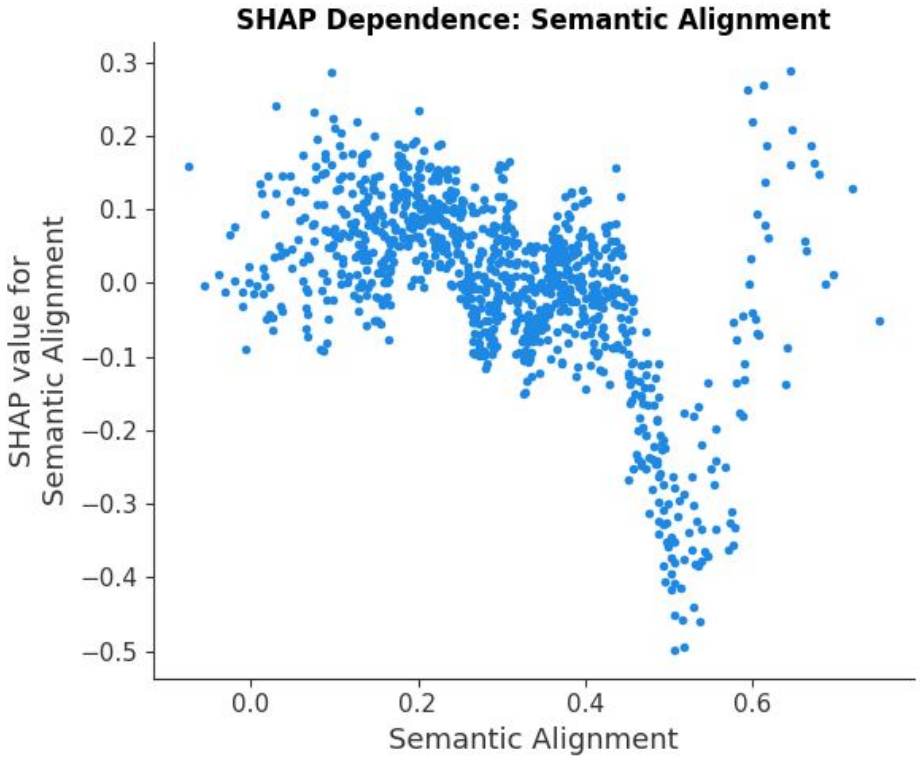


But posting time doesn’t matter so much (maybe try Saturday or Sunday)



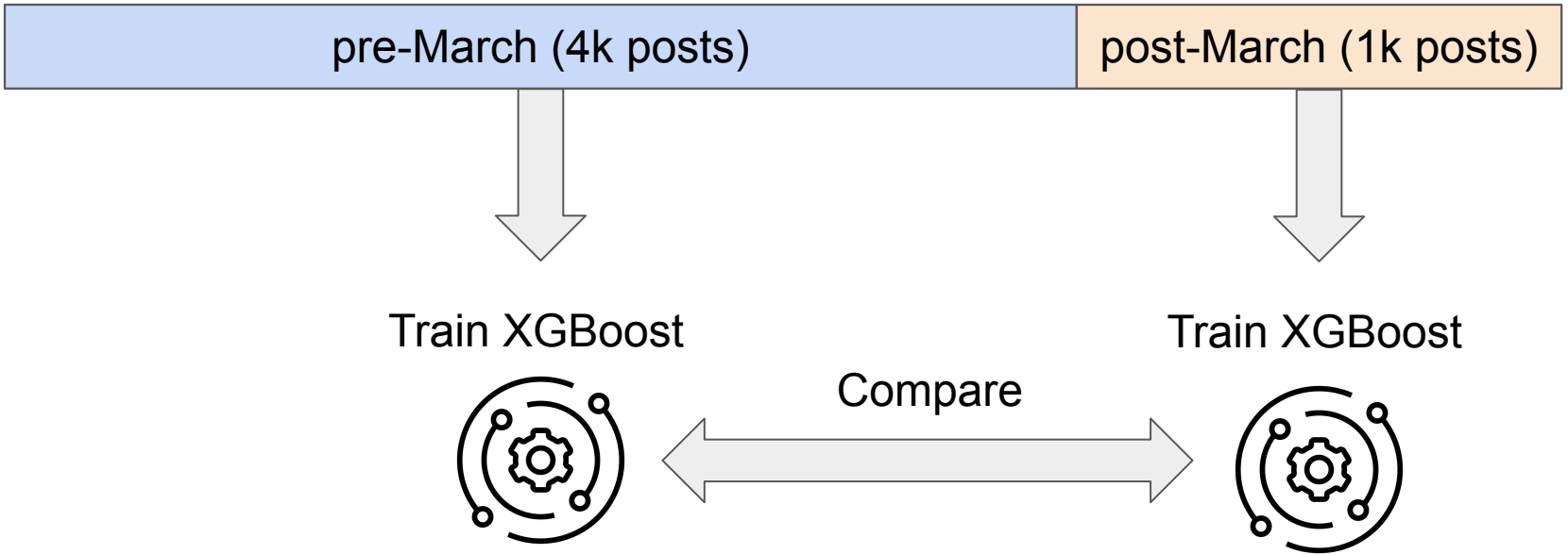


Semantic alignment has ambiguous influence

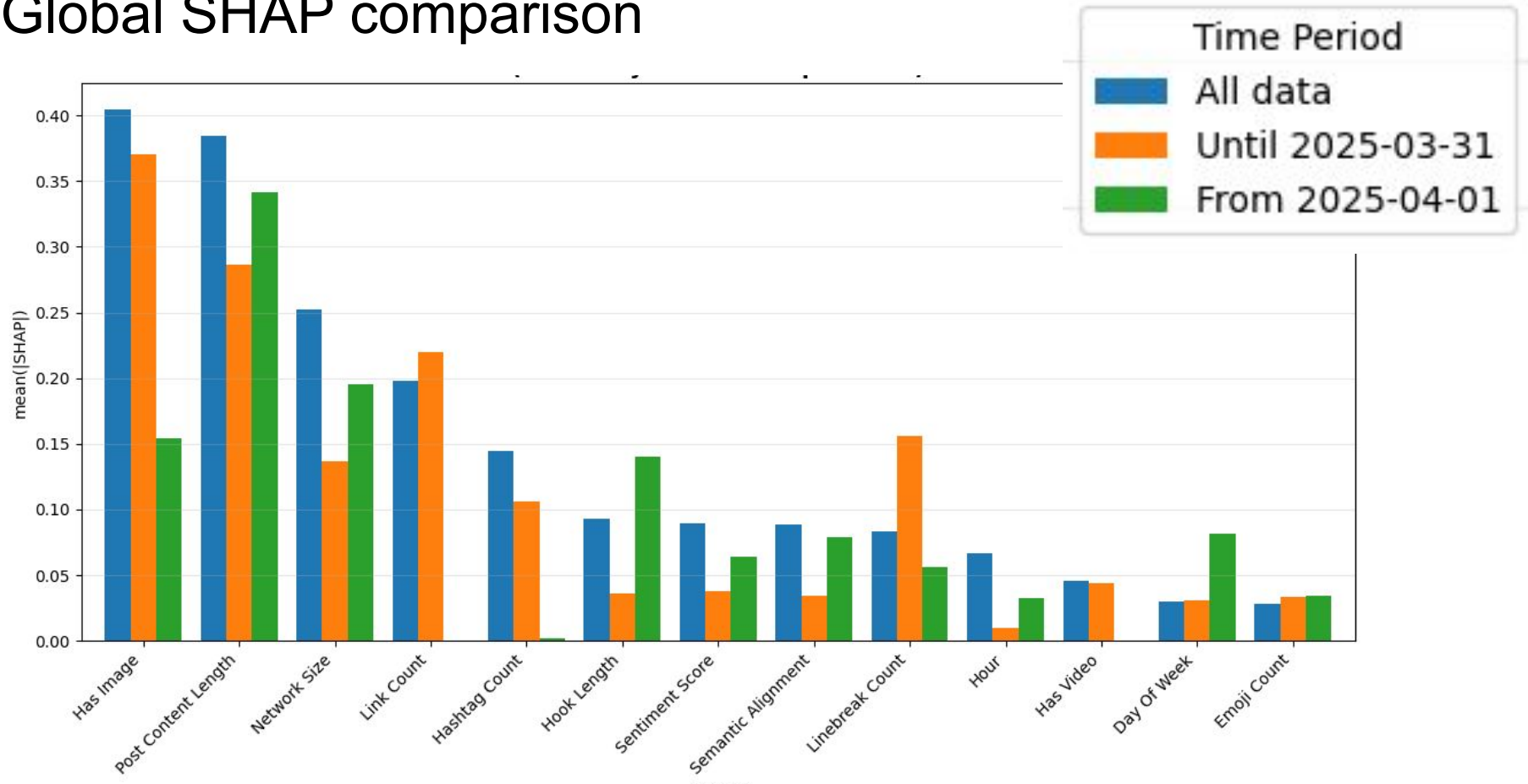


Concept Drift: LinkedIn algorithm change in 2025

Split dataset at March 2025:



Global SHAP comparison



Conclusion

- **Network Size** and **Semantic Alignment** increase in importance
- **Content and Hook Length** remain important drivers
- **Day of week** strongly increases, while **Link Count** becomes completely unimportant

Remark: Due to small post-March dataset, the results require caution

Future Outlook

- **Retrain with more data** post-March 2025 and outside the author’s network
- Apply **GroupKFold** to test model generalization to unseen users
- Deploy model as **Mini-App** with recommendations for post improvements

Recommendations for your next LinkedIn post

1. **Min. 500 characters** long. Avoid simple / empty reposts.
2. Add at least one **image (or video)** to your post
3. **Avoid external links** in the post. Add them in the comments.

In general: increase your network size with meaningful connections

Thank you!

Preprocessed Features

- **User ID:** Firstname + Lastname from Profile.csv
- **Profile Summary:** Headline + Summary from Profile.csv
- **Post URL:** Link to the post from Shares.csv
- **Post Timestamp DT:** Timestamp in GMT+1 from Shares.csv
- **Post Content:** Raw post content from Shares.csv
- **Has Image:** True/False from extractor tool
- **Has Video:** True/False from extractor tool
- **Network Size:** Network size at Post Timestamp DT from Connections.csv