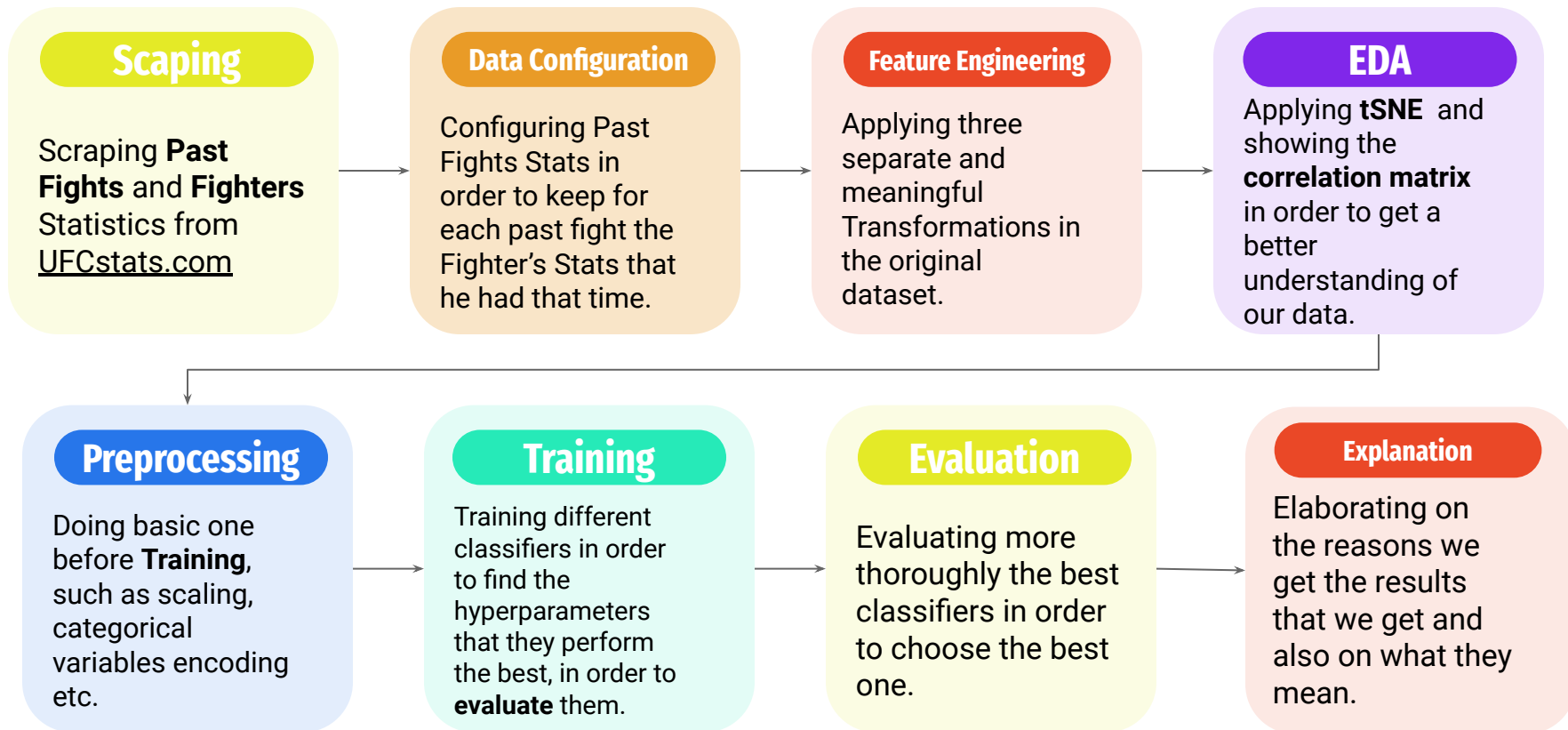


Mixed Martial Arts(MMA) Fights Result Prediction

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Project General Workflow



Feature Engineering

No Transformation

Keeping the instances in the original form.

Double Dataset

Doubling the **training set's** instances by adding the "reverse" instances.

Difference Dataset

Combining each participant's numerical statistics by taking their difference, according the sequence they are written in each instance.

Double Difference Dataset

Applying the second transformation(on the training set **only**) and then applying the third one.

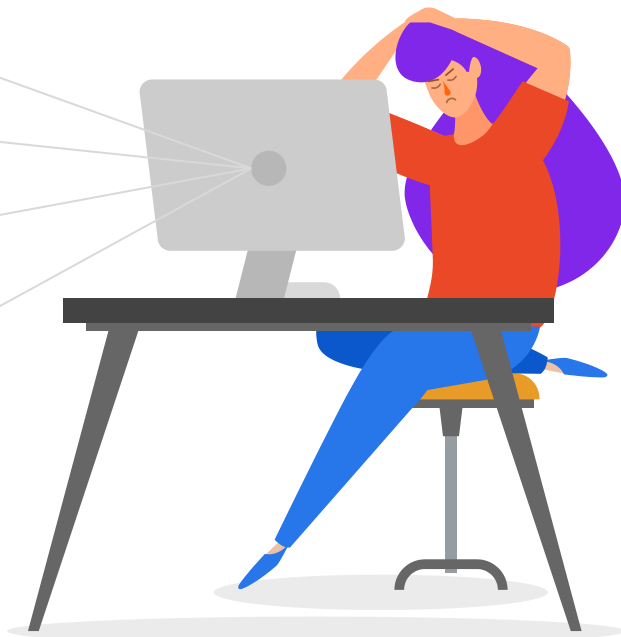
01

02

03

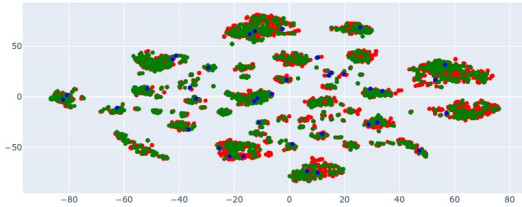
04

Data Transformations

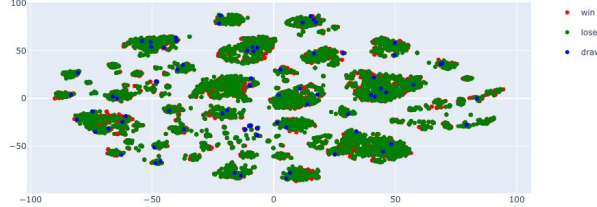


Exploratory Data Analysis-tSNE

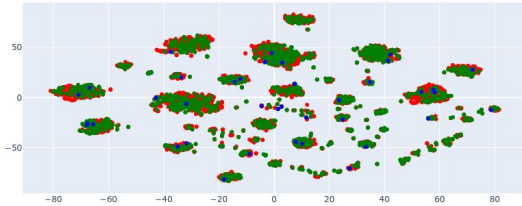
tSNE Results on original Dataset



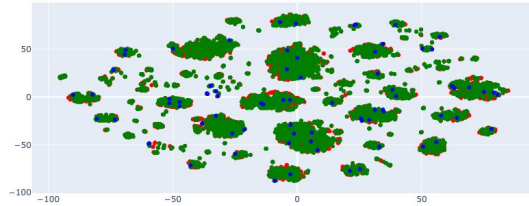
tSNE Results on Dataset with doubled rows via reversing also Fighter's features in each fight(and also the labels)



tSNE Results where we taken the difference between each fighter's numerical features

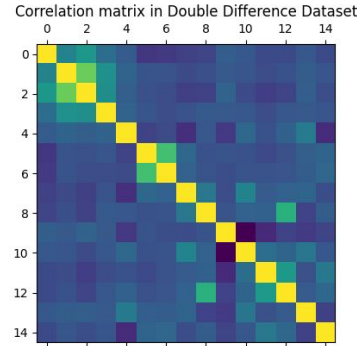
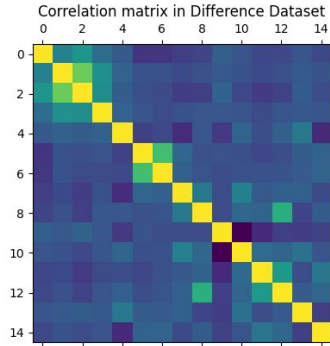
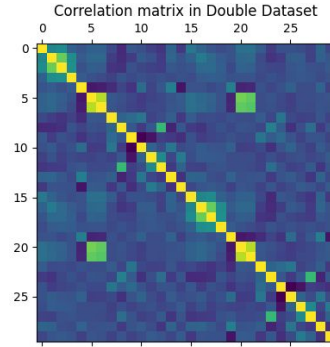
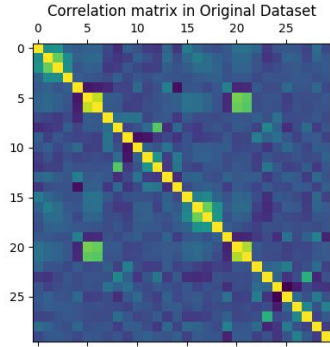


tSNE Results on a doubled dataset which we also took stats' difference



- There are no areas that a particular label prevails.
- Two “near” fights can have different result.
- With those features we cannot expect much from our classifier.
- There is an explanation about these results.

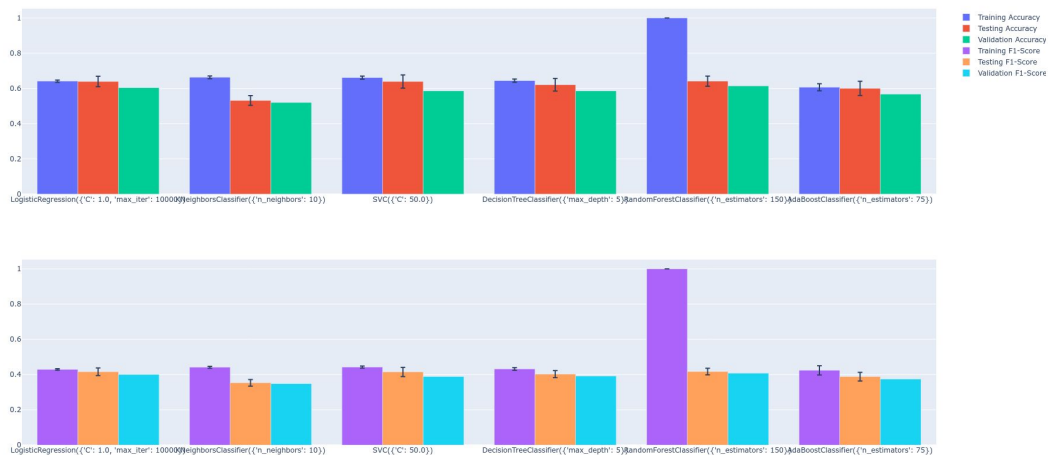
Exploratory Data Analysis-Feature Correlations



- We have not many strong correlations between the labels.
- The only correlations are among each fighter's record and the two striking features.
- But these features are important to keep them.

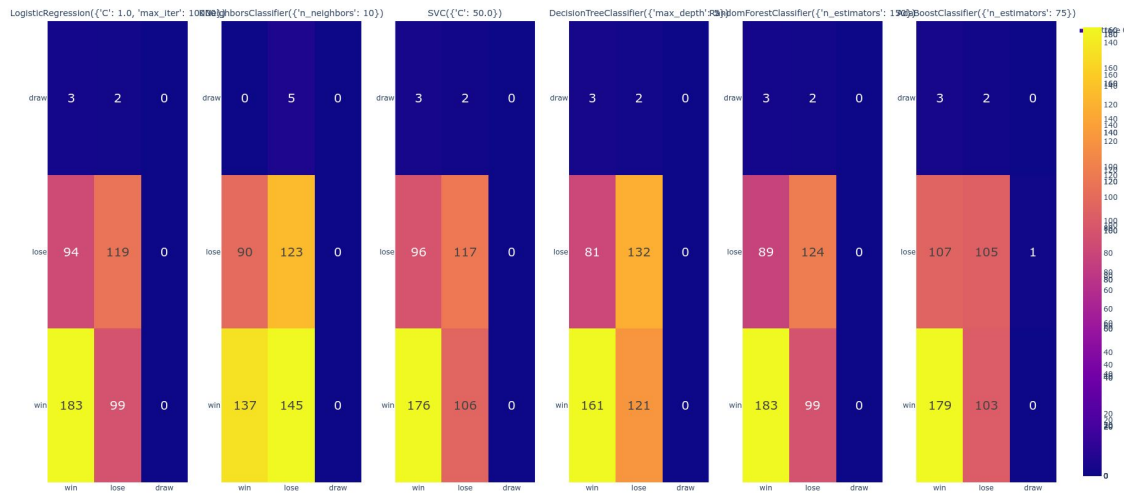
Training & Evaluation Results

Best Classifiers training, testing and validation Accuracy and F1 Score with 95% confidence intervals with Repeated-K-Fold with k=6 and 2 repeats.



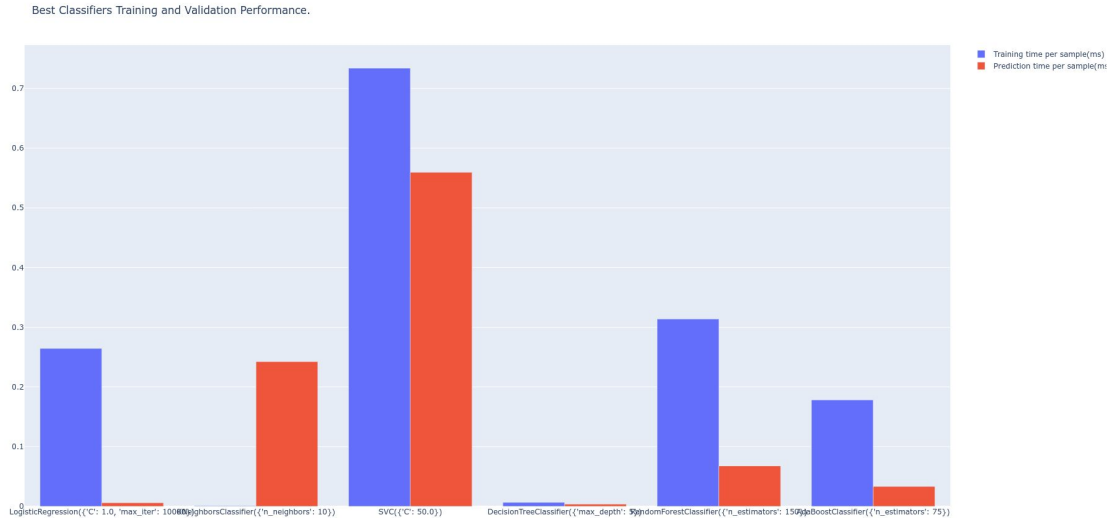
- From further experimentation and hyperparameter tuning I found the best hyperparameters for each classifier.
- Also, I found that the Double Difference Dataset yielded the best results.
- We found Training and Testing accuracy and F1-Score through Repeated K-Fold for 6 fold and 2 repeats.
- Validation Set contained the 500 most recent fights.
- From the results, we see that all classifiers, except one, do not overfit much, while the performance on Testing and Validation Set is almost the same.

Training & Evaluation Results



- I also evaluated each classifier showing their confusion matrices in the Validation Set.
- From the confusion matrices shown, it is clear that Random Forest yields the best and more diverse predictive performance.
- That is, because it is the best at predicting wins and the second best at predicting loses.

Training & Evaluation Results



- In terms of efficiency, we can see that Decision Tree is the fastest one overall.
- But, Random Forest, according to confusion matrix, yields better predictive performance by a wide margin.
- Thus, considering that we do not have too many training data and the predictive efficiency is decent, Random Forest with 150 estimators is the best one.
- Refer to the report in order to see my thorough experimentation.

Conclusion



Communication

- My best classifier still has a pretty low performance with 60% accuracy and 40% micro-F1 Score.
- Doing real-time predictions I saw that our classifier at most times predicted the favorite according to bookmakers. Also, achieved 74% accuracy on 5th February 2022 UFC event.
- Doing calculations, even playing to the most sophisticated multi-line bet it is not certain if someone will get profit from my predictor.



Explanation

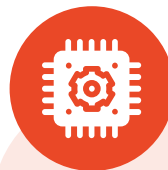
- From tSNE I saw that there were no areas in 2D-space that only one class was strongly prevalent. Thus, the space cannot have a good separation.
- This might happen because most fights are between two equally skilled fighters, thus the fight can go either way, especially if we consider upsets.
- Features are not enough(and may never been) to cover each fighter as a whole.

Further Work



Further Expansions

- Predict the finishing method of the fight.
- Predict the finishing round of the fight(if the **finishing method** is not a decision.



Improvement

- Further Feature Engineering in order to extract more features or do combinations of existing ones.
- Extend the crawlers or create new one in order to retrieve more information that will result in more features.
- Try more sophisticated methods such as XGBoost.

Thank you for your time!!!

Any Questions ???