MacOS & Windows
Text Classification

Data Science Immersive Course
Project 3

Problem Statement

Scenario

Given that
We work for a Tech News & Media Company
that writes/talks about Computer Technology update, which usually choose buzzing and popular topics from social media post to write/talks in our news

Due to high competitiveness in this industry where everyone can become a news reporter and publisher, Business positioning is a must!, we can't just write random article about this and that just like before

In response,
Our company is deciding to be more specific and subjective, whether our news is to serve Apple or Windows fanboy for our brand positioning sake!

Mac or Windows,
What we need is the tool to skim through posts whether each one is about Windows or Mac so we can choose post for our upcoming article correctly !

Our Plan

Find out

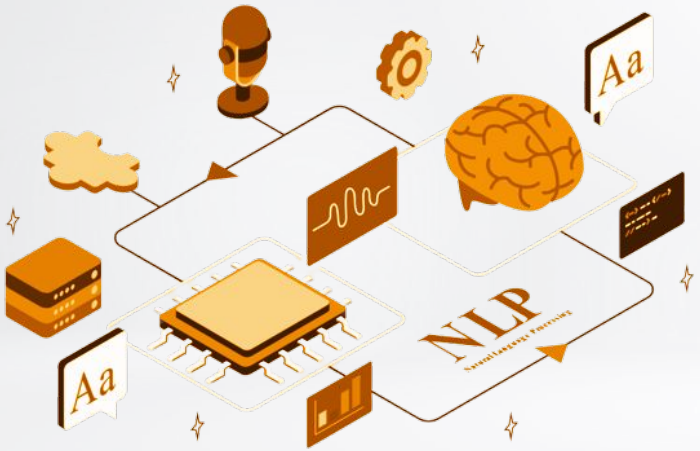
1. **Most Precise Classification Model** to classify text from social media alike.

2. **Recommendation** for further studies and Business strategy/execution suggestion

Methodology

1. **Most Precise Classification Model**
to classify resemble text from social media.

Text Classification Modeling



NLP Technique for Feature engineering:
This involves transforming the raw text data into a numerical representation that can be used by the machine learning model. This will be done using a technique called as bag-of-words (CountVectorizer).

Model selection and training:
Once the text data has been transformed into a numerical representation, a machine learning model can be selected and trained

Our variety machine learning models that will be used for text classification are including **Logistic Regression, Decision Tree, Random Forests, KNN-neighbor and Multinomial Naive Bayes.**

Methodology Process

2 Datasets

Scraped Text from Reddit
Period: Year 2010-2022

MacOS: 14,271 rows, 23 columns
Windows: 2,500 rows, 22 columns

EDA

Exploratory Data Analysis

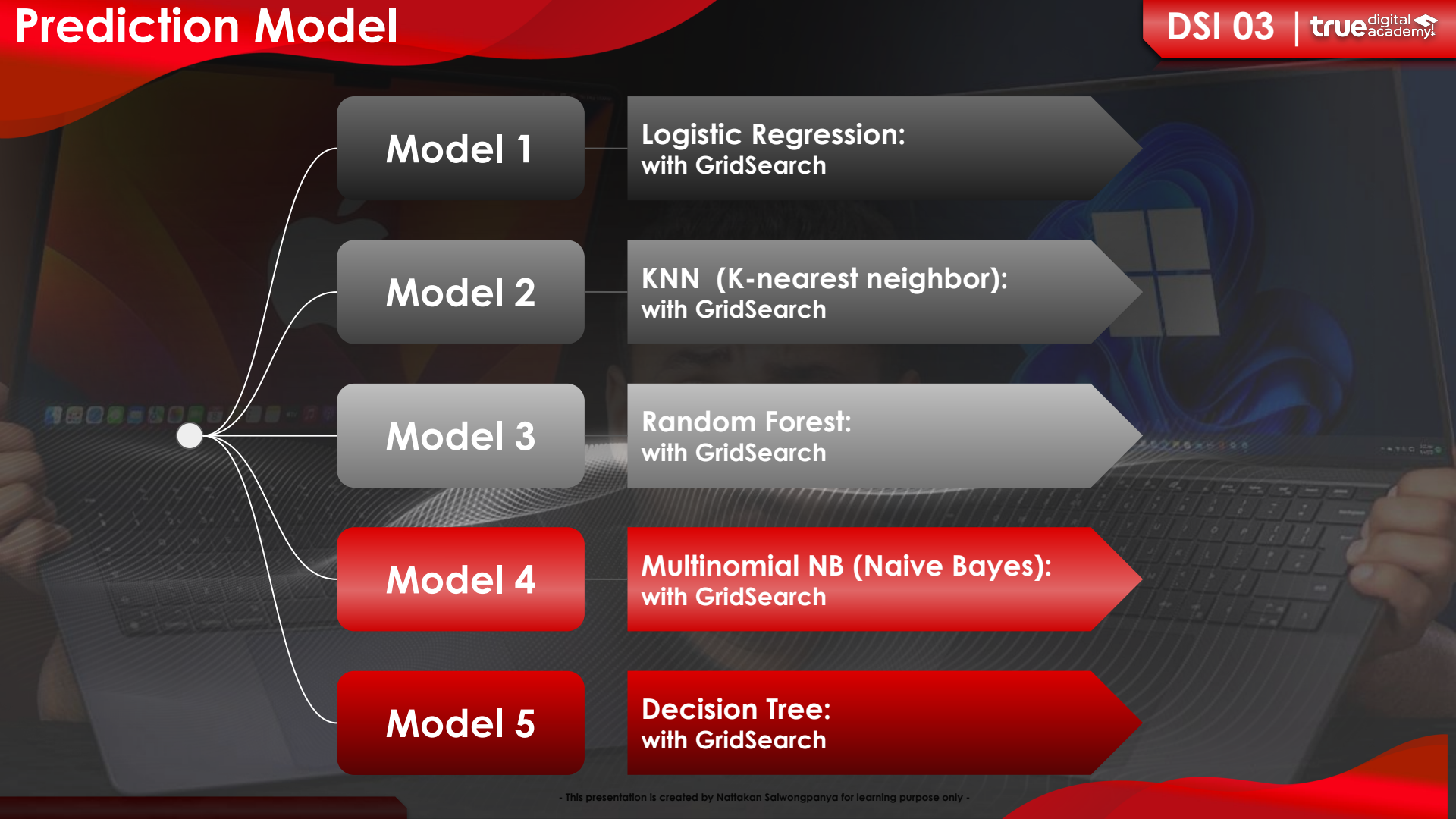
Data Cleansing

Data Imputation
(i.e. filling/dropping missing values, duplicates filtering out odd ones)

Feature Engineering
NLP Technique:
Bag of words

Modeling & Prediction

Prediction Model



Model 1 : Logistic Regression

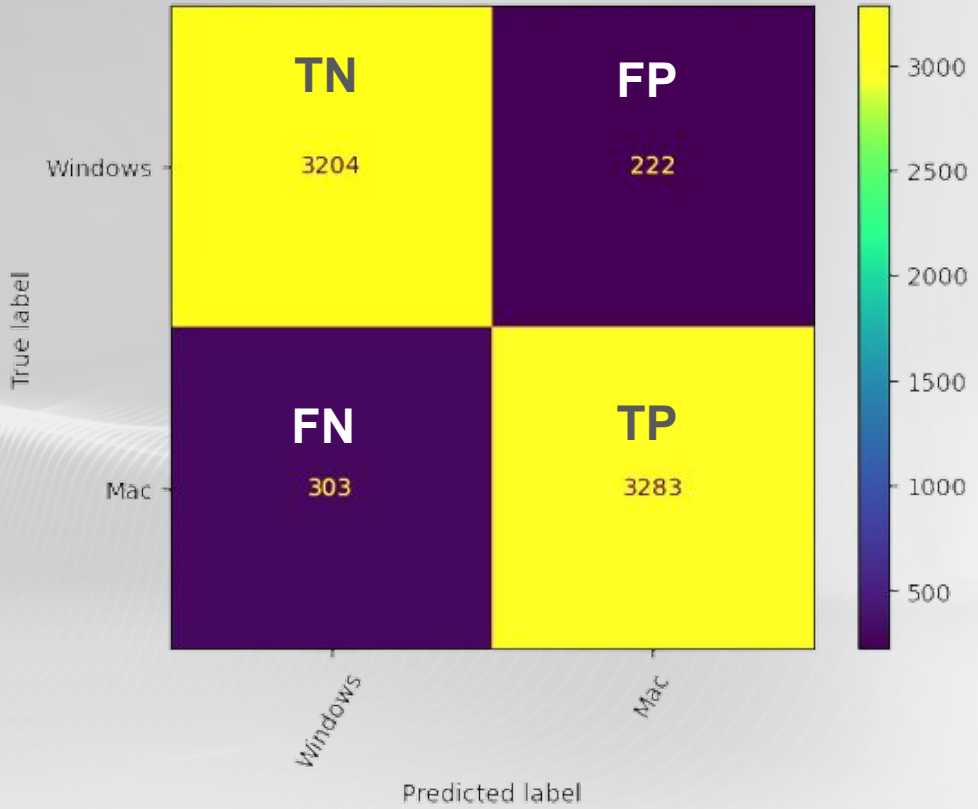
Metric	Score
Accuracy (Train Set)	0.99
Accuracy (Validation Set)	0.93
Recall (Mac)	0.92
Recall (Windows)	0.94
F1 Score*	0.93
Precision Score*	0.93

Weighted Average*

Verdict

- **Overfit**
- Underfit
- **Just Right**
- Lack of precision

Confusion Matrix

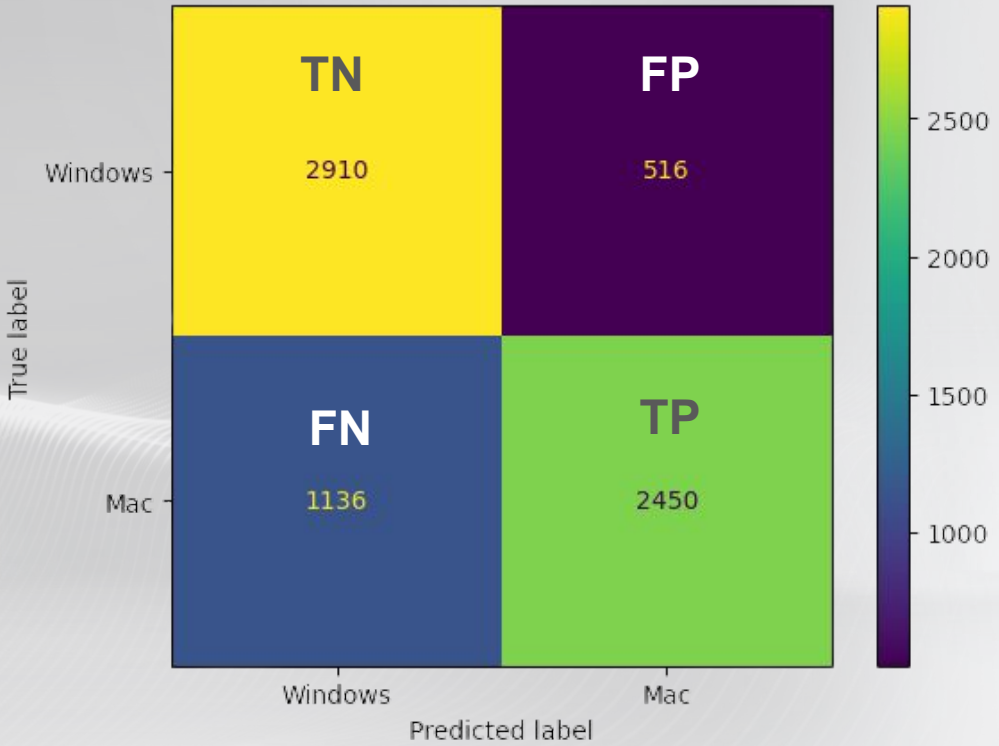


Model 2 : KNN (K-nearest neighbor)

Metric	Score
Accuracy (Train Set)	0.84
Accuracy (Validation Set)	0.76
Recall (Mac)	0.68
Recall (Windows)	0.85
F1 Score*	0.76
Precision Score*	0.77

Weighted Average*

Confusion Matrix



Verdict

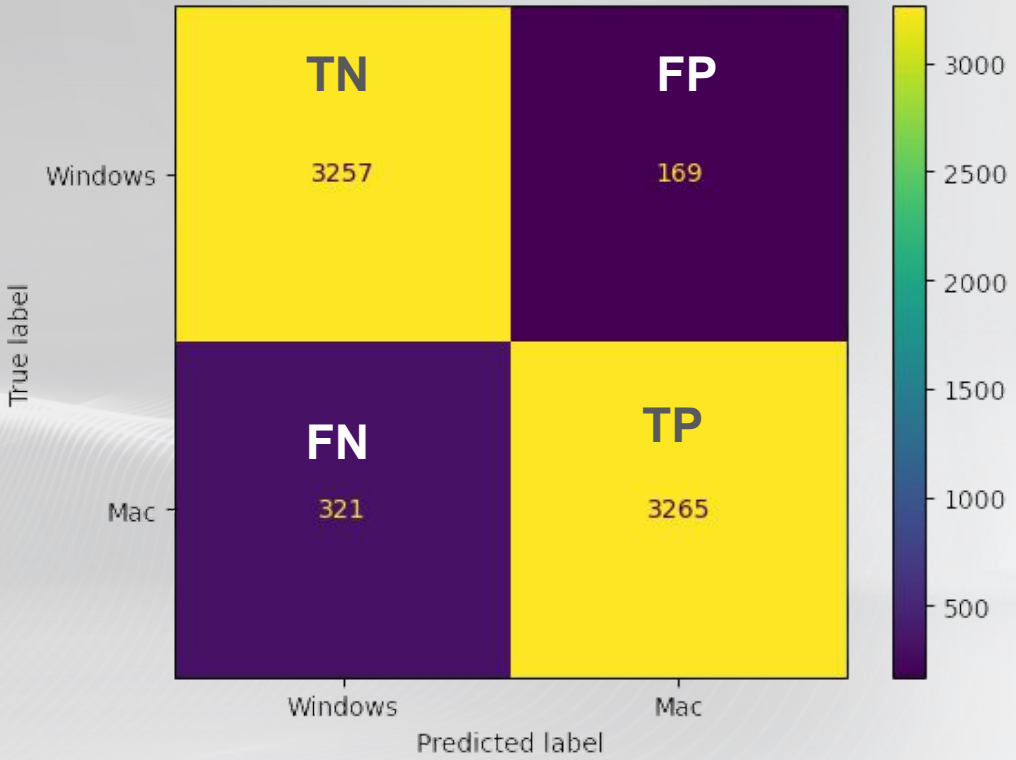
- **Overfit**
- Underfit
- Just Right
- **Lack of Precision**

Model 3 : Random Forest

Metric	Score
Accuracy (Train Set)	0.99
Accuracy (Validation Set)	0.93
Recall (Mac)	0.91
Recall (Windows)	0.95
F1 Score*	0.93
Precision Score*	0.93

Weighted Average*

Confusion Matrix



Verdict

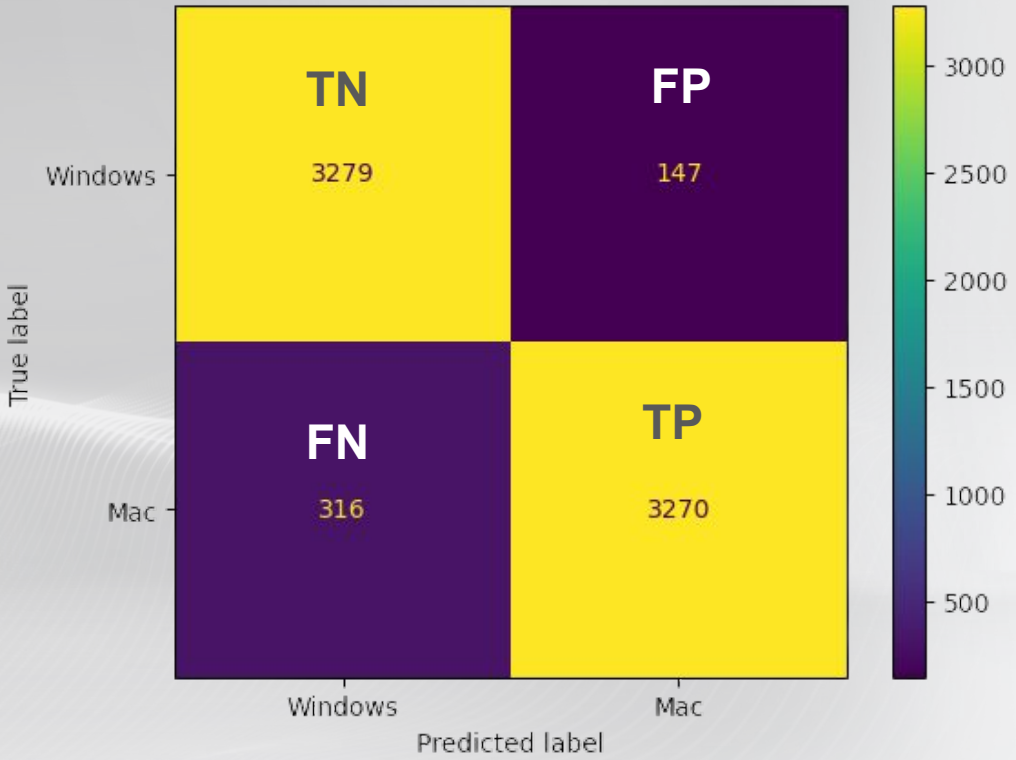
- **Overfit**
- Underfit
- **Just Right**
- Lack of precision

Model 4 : Multinomial NB (Naive Bayes)

Metric	Score
Accuracy (Train Set)	0.95
Accuracy (Validation Set)	0.96
Recall (Mac)	0.91
Recall (Windows)	0.85
F1 Score*	0.93
Precision Score*	0.94

Weighted Average*

Confusion Matrix



Verdict

Overfit

Underfit

Just Right

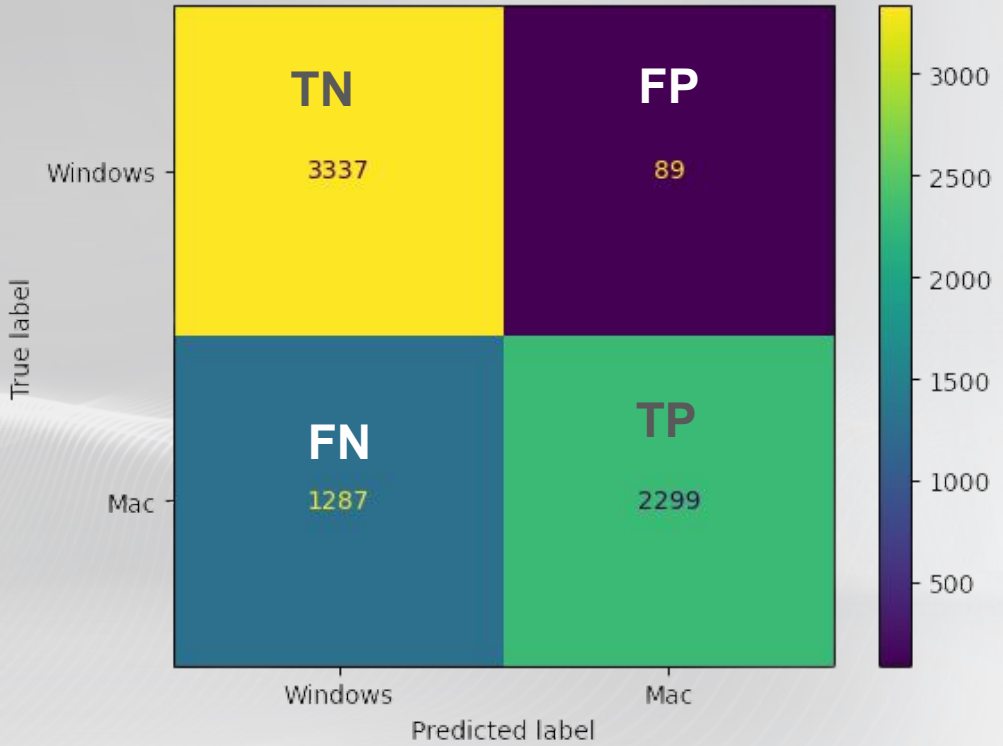
Lack of precision

Model 5 : Decision Tree

Metric	Score
Accuracy (Train Set)	0.81
Accuracy (Validation Set)	0.80
Recall (Mac)	0.64
Recall (Windows)	0.97
F1 Score*	0.76
Precision Score*	0.84

Weighted Average*

Confusion Matrix



Verdict

Overfit

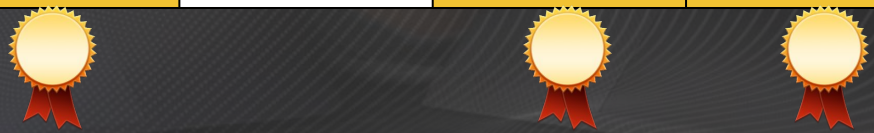
Underfit

Just Right

Lack of Precision

Model Performance

Metric	Model1 (LR)	Model2 (KNN)	Model3 (RF)	Model4 (NB)	Model5 (DT)
Accuracy (Train Set)	0.99 Overfit	0.84 Overfit	0.99 Overfit	0.95 Underfit	0.81 Overfit
Accuracy (Validation Set)	0.93	0.76	0.93	0.96	0.80
Recall (Mac)	0.92	0.68	0.91	0.91	0.64
Recall (Windows)	0.94	0.85	0.95	0.85	0.97
F1 Score*	0.93	0.76	0.93	0.93	0.76
Precision Score*	0.93	0.77	0.93	0.94	0.84



Error Analysis

Error Type I : Mentioning both Operation System in one post

Running Windows 10 along side Mo’jave? For those of you who are running Windows 10 on your Ma c, do you find BootCamp to be an adequate solution or do you use Parallels?

Another question pertains to software that you use. For example, Office 365 is more fully deve loped with support for Access and Publisher on the Windows platform. However several applicati ons run great on Mac. How would you recommend running Office 365 Home?

Error Type II : User Error (Posting on Wrong subreddit)

[Windows 7] How do you disable pointer speed buttons on mouses? Every time I buy an extra butt ons mouse there's a button right under the scroll that Windows decides to change to a pointer speed/sensitivity adjusting button. I can usually assign it to something else in video games, but when I can't it becomes extremely annoying when I accidentally press it. Does anyone know how to disable this function?

Conclusion

Business Recommendation

Logistic Regression, Random Forest and Multinomial Naive Bayes

are among the best model to classify such text with high precision score.
Although we suggest improve these 3 models to be able to classify 3 class labels for more practical utilization. (i.e. given class below)
0: None of 2
1: Mac
2: Windows

As problem statement,
it states that text that will be used to classified will come from all over the place.

Further Studies

We could try these following to improve the model,
Neatly clean our dataset since there are slightly chance of data contamination (mislabelling post)
Mix with text sources from other platform to stimulate our model with environment our unseen data could possibly come from

Thank you