

Intent Detection in Bangla Dataset for the Food Domain using BERT and Machine Learning Techniques

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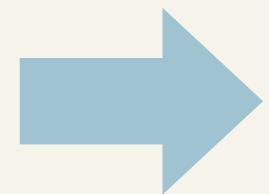
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Engineering

OVERVIEW

- Introduction
- Objectives
- Motivation
- Literature Review
- Methodology
- Used Models
- Result Analysis
- Conclusion
- Limitations
- Future Work

INTRODUCTION



What is intent detection?



What is the importance of intent detection ?

OBJECTIVES

- What is the main purpose of this research?
- What is the purpose of working on intent detection in Bengali language?
- Why did we choose the food domain for our dataset?

MOTIVATION

Contribution To The Bengali Language Community

Lack of Bengali-Specific Datasets related to Food

Join Research Community

Personal Interest

LITERATURE REVIEW

Paper Title	Intent Number	Dataset	Best Models	Result
A Stack-Propagation Framework with Token-Level Intent Detection for Spoken Language Understanding.	7	SNIPS	Stack-Propagation + BERT	92.9% in intent accuracy
Intent Detection and Slot Filling for Home Assistants: Dataset and Analysis for Bangla and Sylheti	10	<u>Bangla-sylheti-snips</u>	GPT-3.5	F1 score of 0.94 in intent detection F1 score of 0.51 in slot filling

LITERATURE REVIEW

Paper Title	Intent Number	Dataset	Best Models	Result
Attention-Based Recurrent Neural Network Models for Joint Intent Detection and Slot Filling	26	ATIS	Attention BiRNN	1.79% in intent detection error rate F1 score of 95.98 in slot filling
BERT for Joint Intent Classification and Slot Filling.	26	ATIS	Joint BERT	97.5% in intent accuracy 96.1% in slot filling

FEATURES OF THE DATASET

Some Of Intent In Dataset:

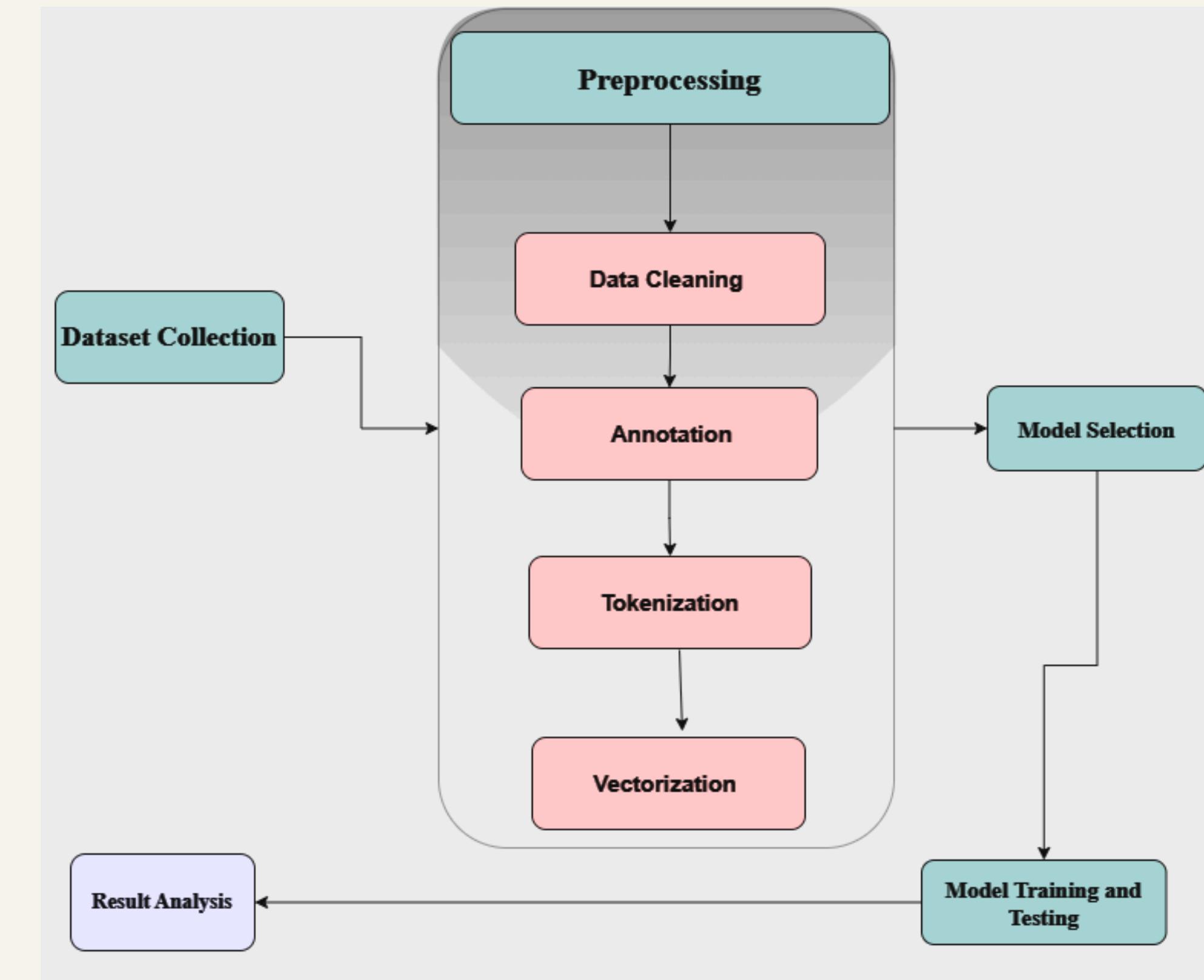
- Benefit
- Best_Fooditem
- Delicious
- FavouriteFooditem
- Fooditem_Location
- Recipe

Case	Our Work
Dataset Size	4539
Data type	Only Bangla
Number of Intent	19
Contain Emoji	No
Data Sources	Youtube and Facebook

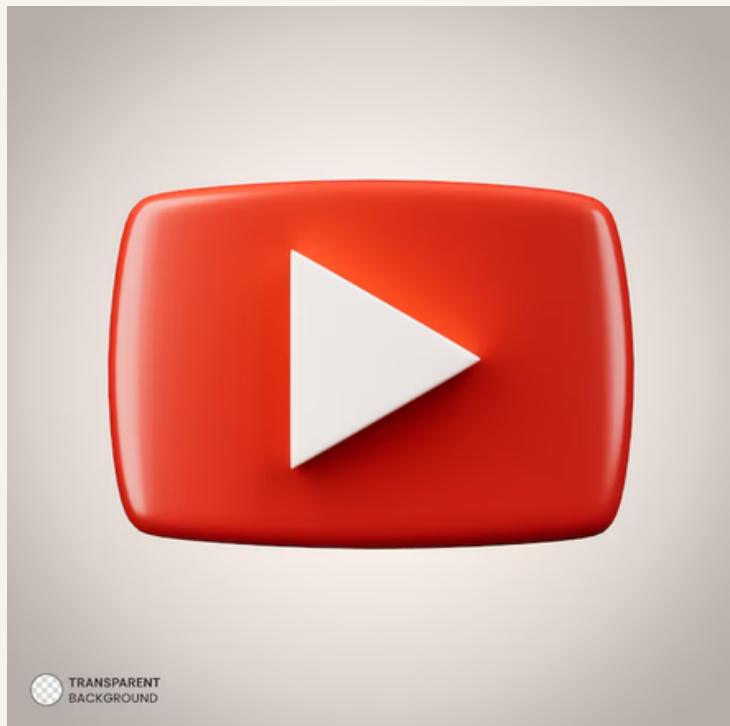
INFRASTRUCTURE AND TOOLS

Hardware Specifications	Cloud Services	Documentation and Reporting	Programming Language
CPU:AMD Ryzen 5 5600G with Radeon Graphics Base speed: 3.90 GHz, Sockets: 1,Cores: 6	Google Colab	Microsoft Word	Python
Memory: 16.0 GB, Speed: 2133 MHz	---	Google Docs	---
Storage: Samsung SSD 970 EVO Plus 500GB	---	Canva	---

METHODOLOGY



DATA COLLECTION PROCEDURE



- Get video id from YouTube video
- Run Apps Script
- Fetched Data
- Also collect data manually
- New Google Sheet Created



- Get Facebook post link
- Use APify post scraper actor
- Add the CSV file in Google sheet
- Also collect data manually

PREPROCESSING PROCEDURES

DATA CLEANING

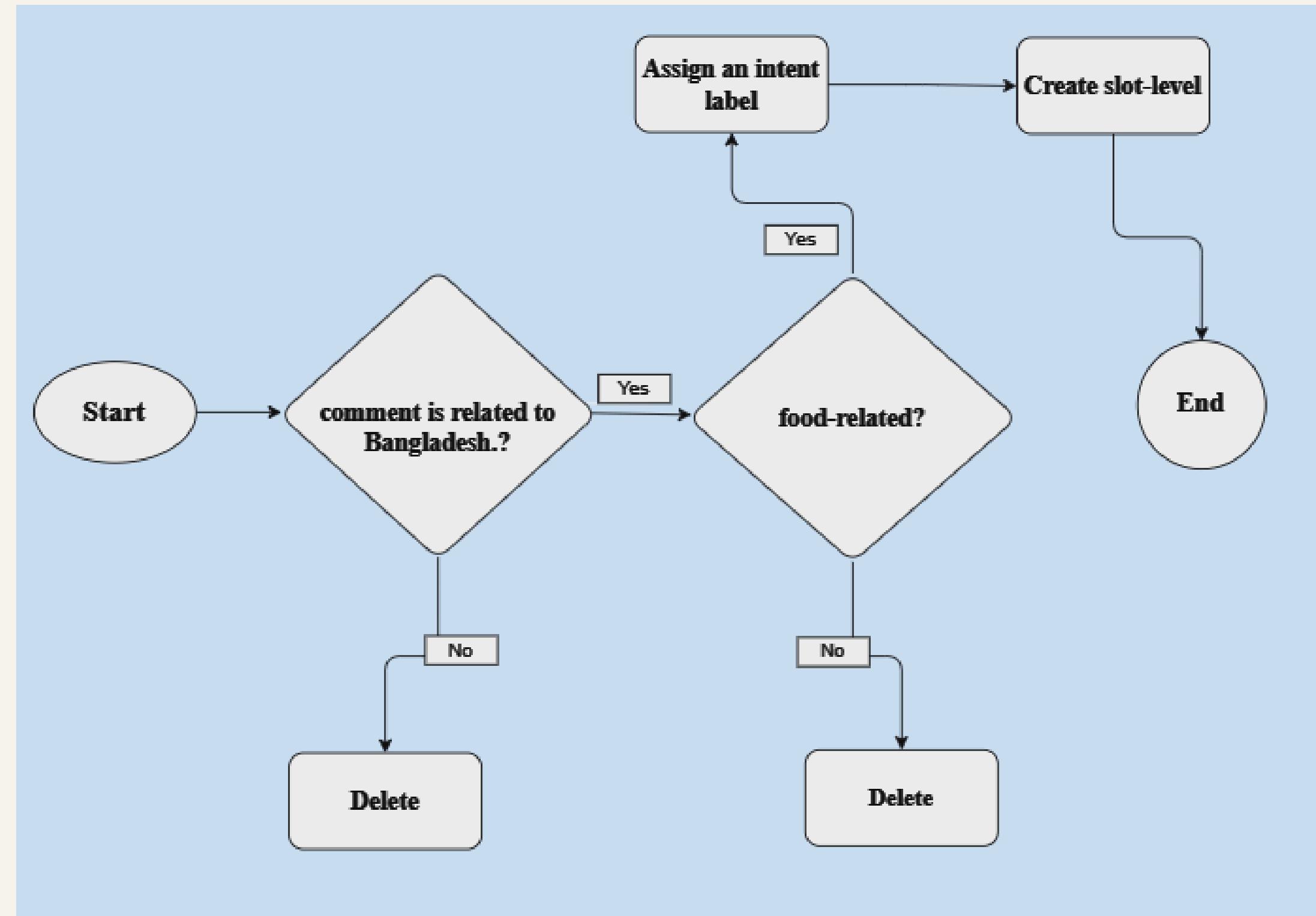
- Removed the Banglisch and English comments.
- Eliminated unnecessary columns and rows.
- Removed repeated words.
- Fixed errors and handled any missing values.
- Removed special specifiers and emojis.



DATA ANNOTATION

- The most important task in our data set is to annotate intents and slots.
- Annotating each piece of data with some predefined intents.
- Then slot level the data of each intent.

DATA ANNOTATION



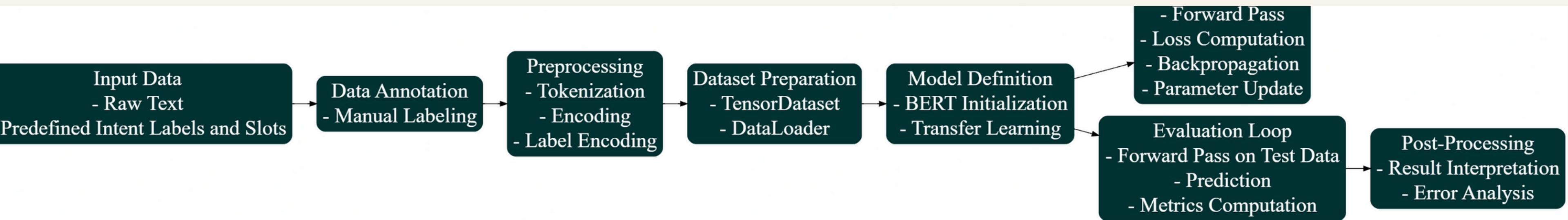
SAMPLE OF DATASET

Domain	Intent	Line	value0	entity0	value1	entity1	value2	entity2	value3	entity3
Food	Best_FoodItem	পেটের জন্য সেরা দই কোনটা	সেরা	B_quality.best	দই	B_foodItem				
Food	FoodItem_Location	ঢাকার কোথায় ভালো চা পাওয়া যায়	ঢাকার	B_location	ভালো	B_quality.best	চা	B_foodItem		
Food	Recipe	আপনার প্রিয় চা রেসিপি কী	প্রিয়	B_favourite	চা	B_foodItem	রেসিপি	B_quality.recipe		

USED MODELS

Transformer	Classification
BERT-based	Support Vector Machine (SVM)
	Logistic Regression

WORK FLOW OF BERT-BASED



RESULTS ANALYSIS

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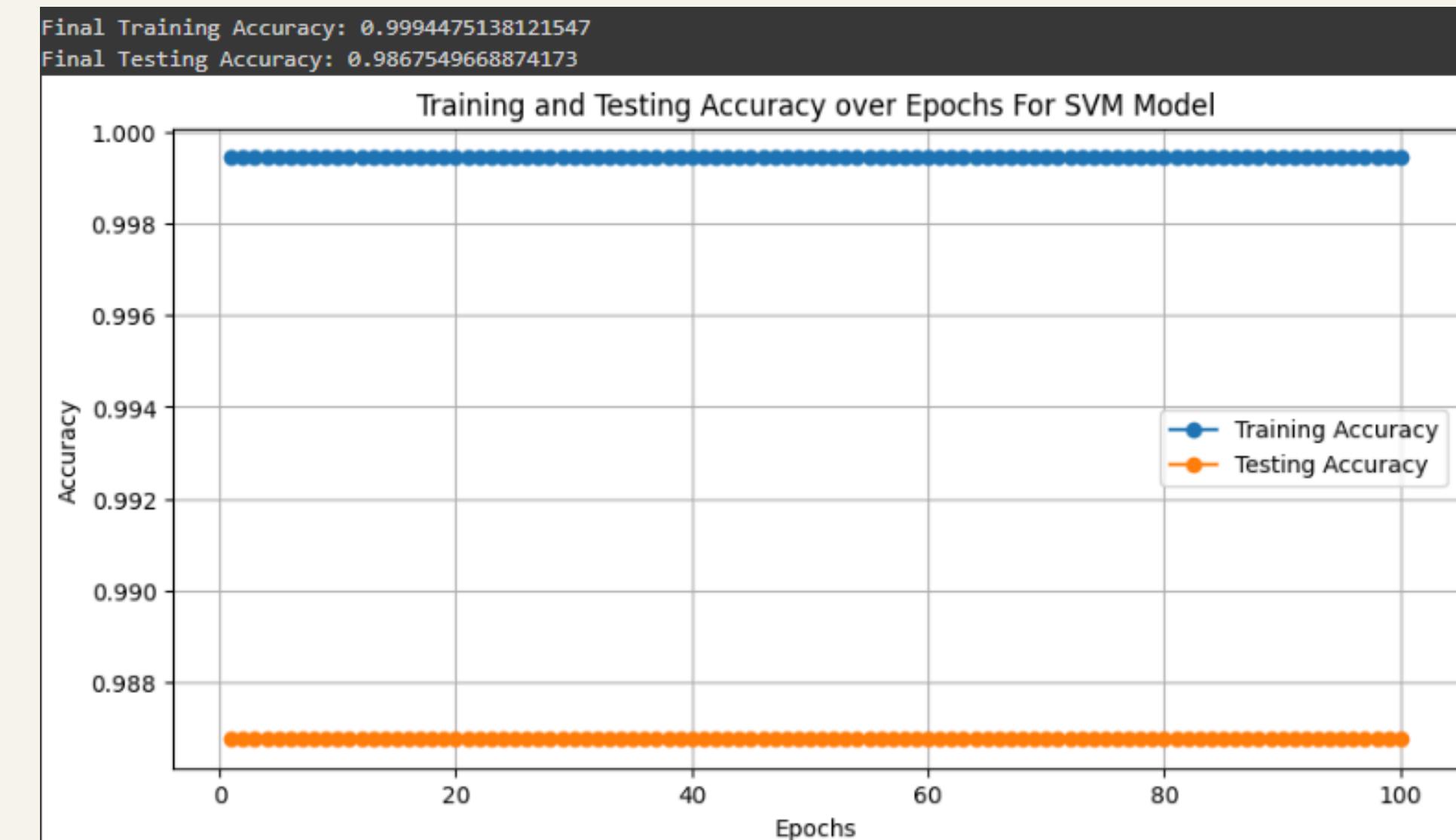
Epoch 1: 100%|██████████| 114/114 [1:07:41<00:00, 35.62s/it]
Average training loss: 1.3169107492032803
Epoch 2: 100%|██████████| 114/114 [1:07:05<00:00, 35.31s/it]
Average training loss: 0.5418923116828266
Epoch 3: 100%|██████████| 114/114 [1:07:15<00:00, 35.40s/it]
Average training loss: 0.2612214460315412
Epoch 4: 100%|██████████| 114/114 [1:06:49<00:00, 35.17s/it]
Average training loss: 0.15341469194543988
Epoch 5: 100%|██████████| 114/114 [1:06:43<00:00, 35.12s/it]
Average training loss: 0.10861243523265186
Evaluation: 100%|██████████| 29/29 [05:21<00:00, 11.10s/it]Accuracy: 0.980176211453744
Precision: 0.9708334087038899
Recall: 0.9801762114537445
F1-Score: 0.9747522728939665

```

	precision	recall	f1-score
0	1.00	1.00	1.00
1	0.97	1.00	0.98
2	1.00	1.00	1.00
3	0.75	0.50	0.60
4	1.00	1.00	1.00
5	1.00	1.00	1.00
6	1.00	1.00	1.00
7	1.00	1.00	1.00
8	0.97	1.00	0.98
9	0.00	0.00	0.00
10	1.00	1.00	1.00
11	0.00	0.00	0.00
12	0.00	0.00	0.00
13	0.80	0.96	0.87
14	0.65	0.92	0.76
15	0.00	0.00	0.00
16	1.00	1.00	1.00
17	0.90	1.00	0.95
18	1.00	0.95	0.98
19	1.00	1.00	1.00
accuracy			0.98
macro avg	0.74	0.75	0.74
weighted avg	0.97	0.98	0.97

Result Of BERT Model

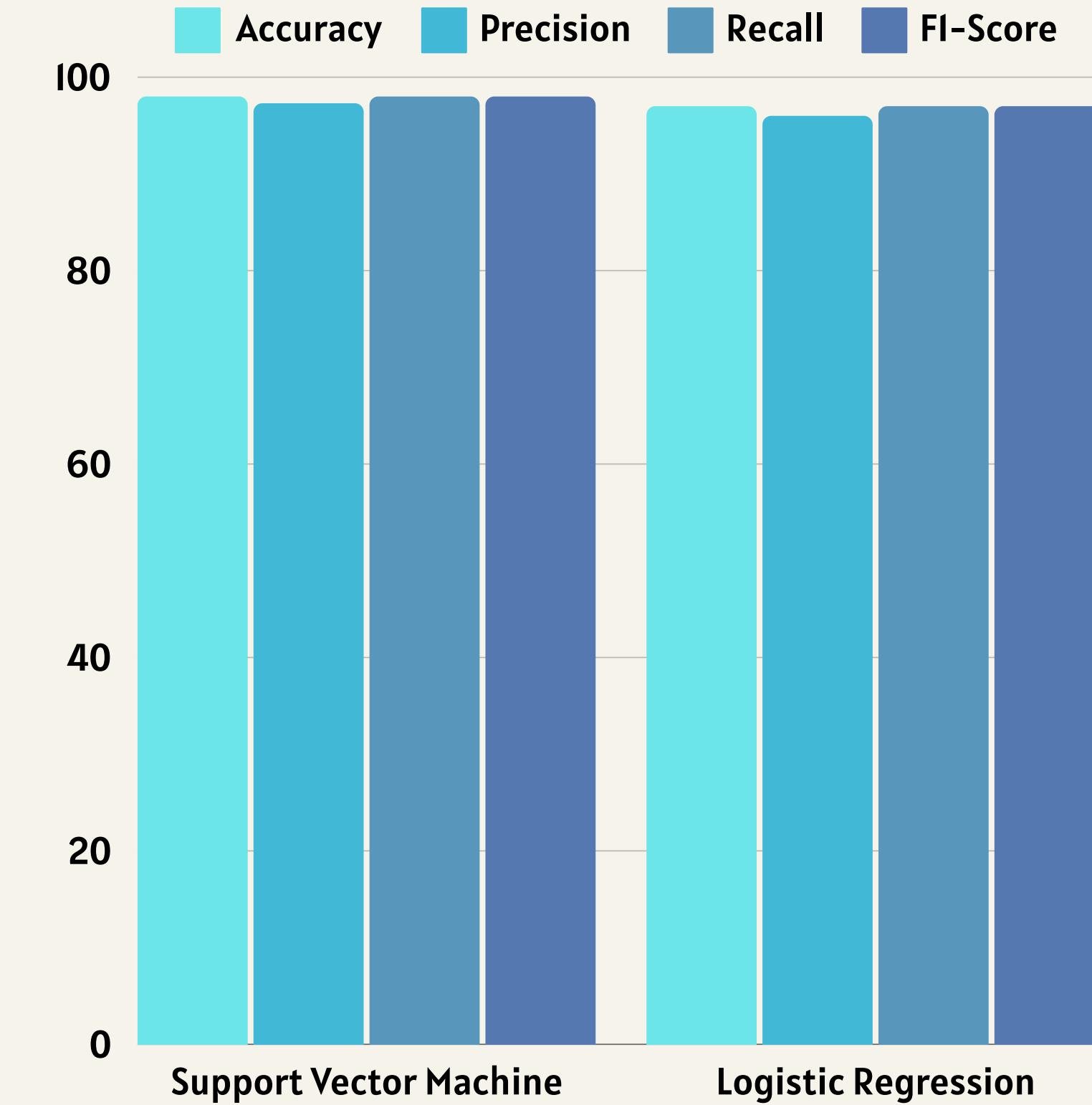
RESULTS ANALYSIS



CLASSIFICATION MODELS RESULTS

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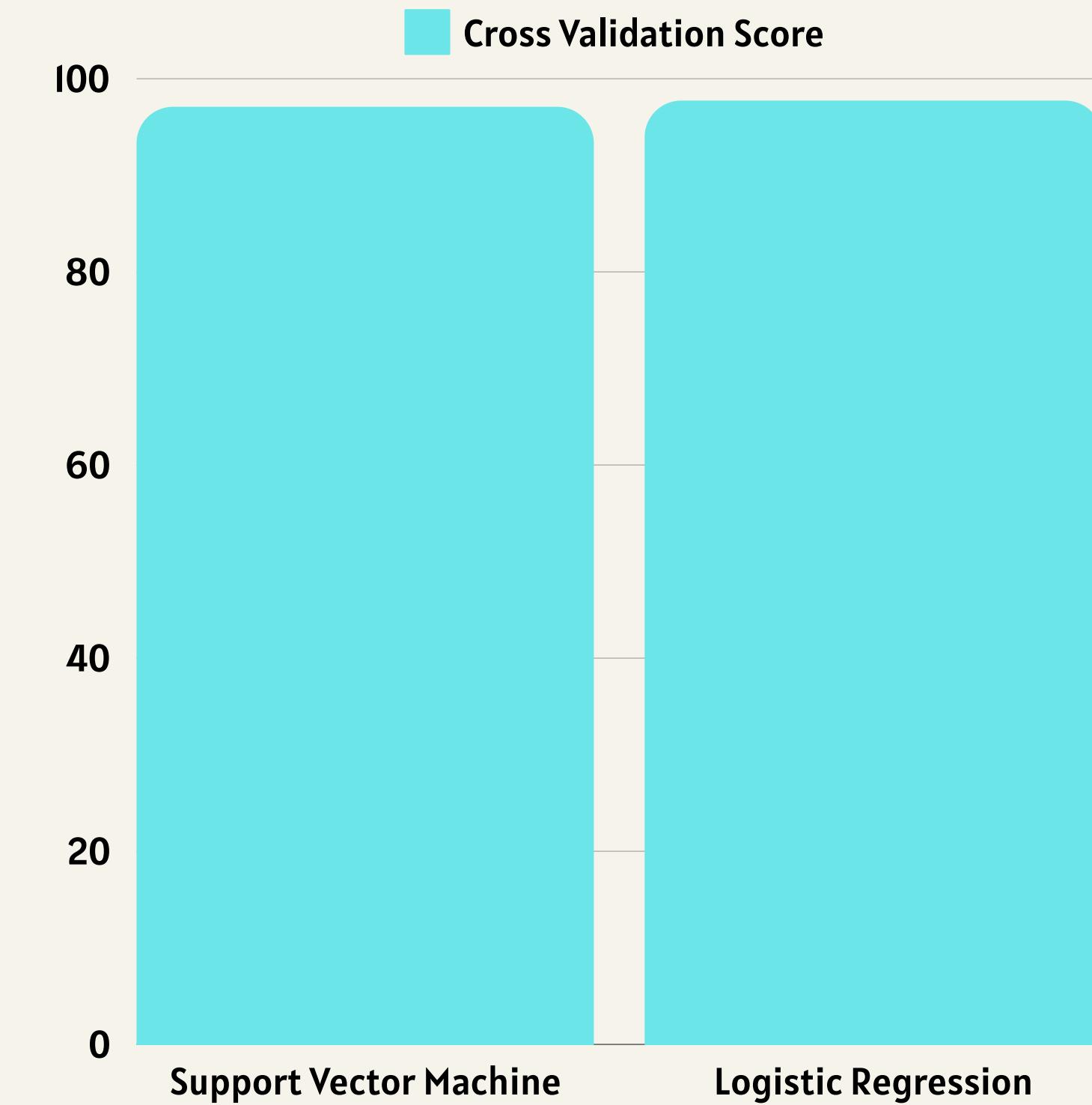
Models	Accuracy	Precision	Recall	F1- score
Support Vector Machine (SVM)	98	97	98	98
Logistic Regression	97	96	97	97



CLASSIFICATION MODELS RESULTS

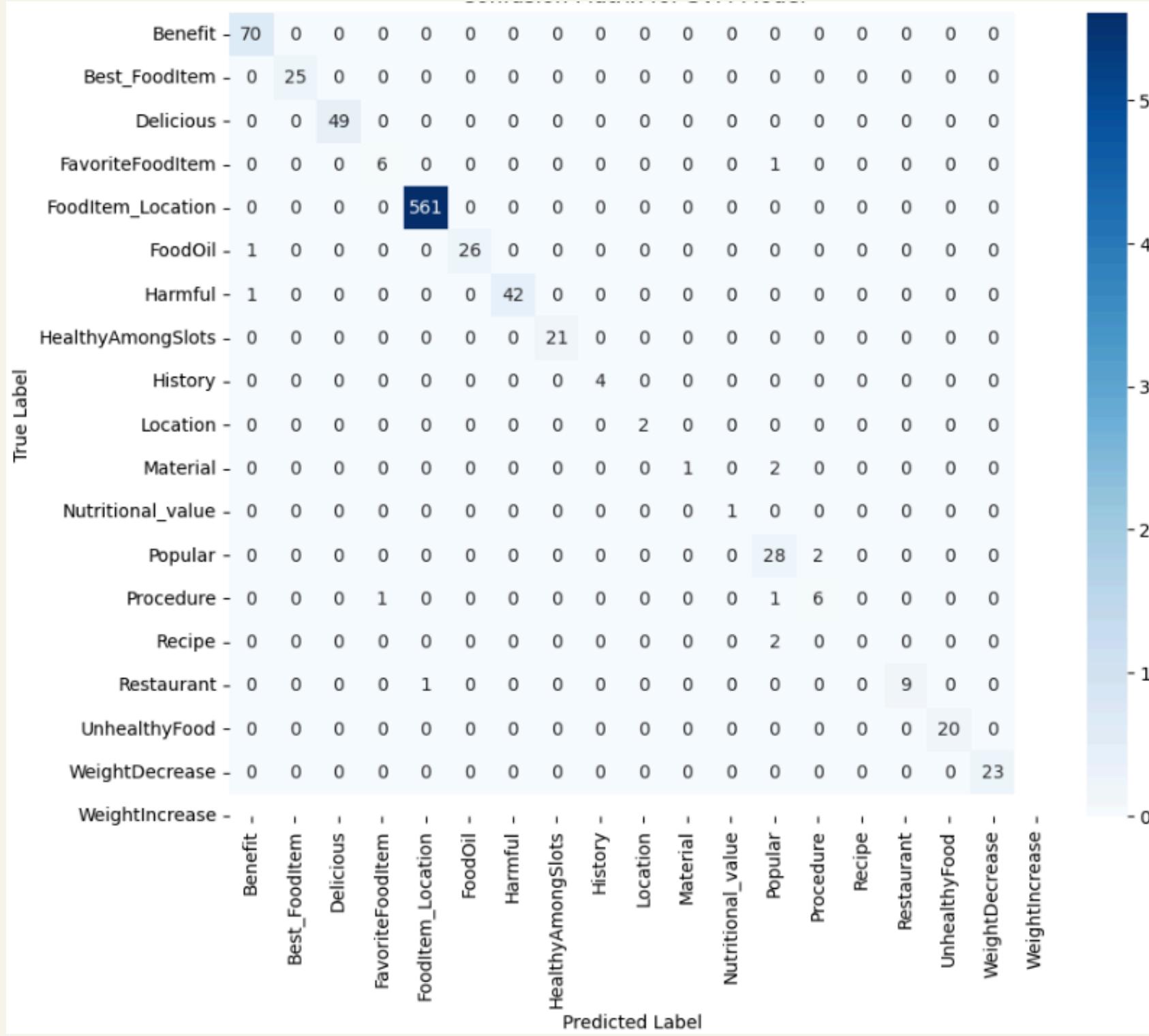
20

Models	Cross Validation score
Support Vector Machine (SVM)	97
Logistic Regression	98

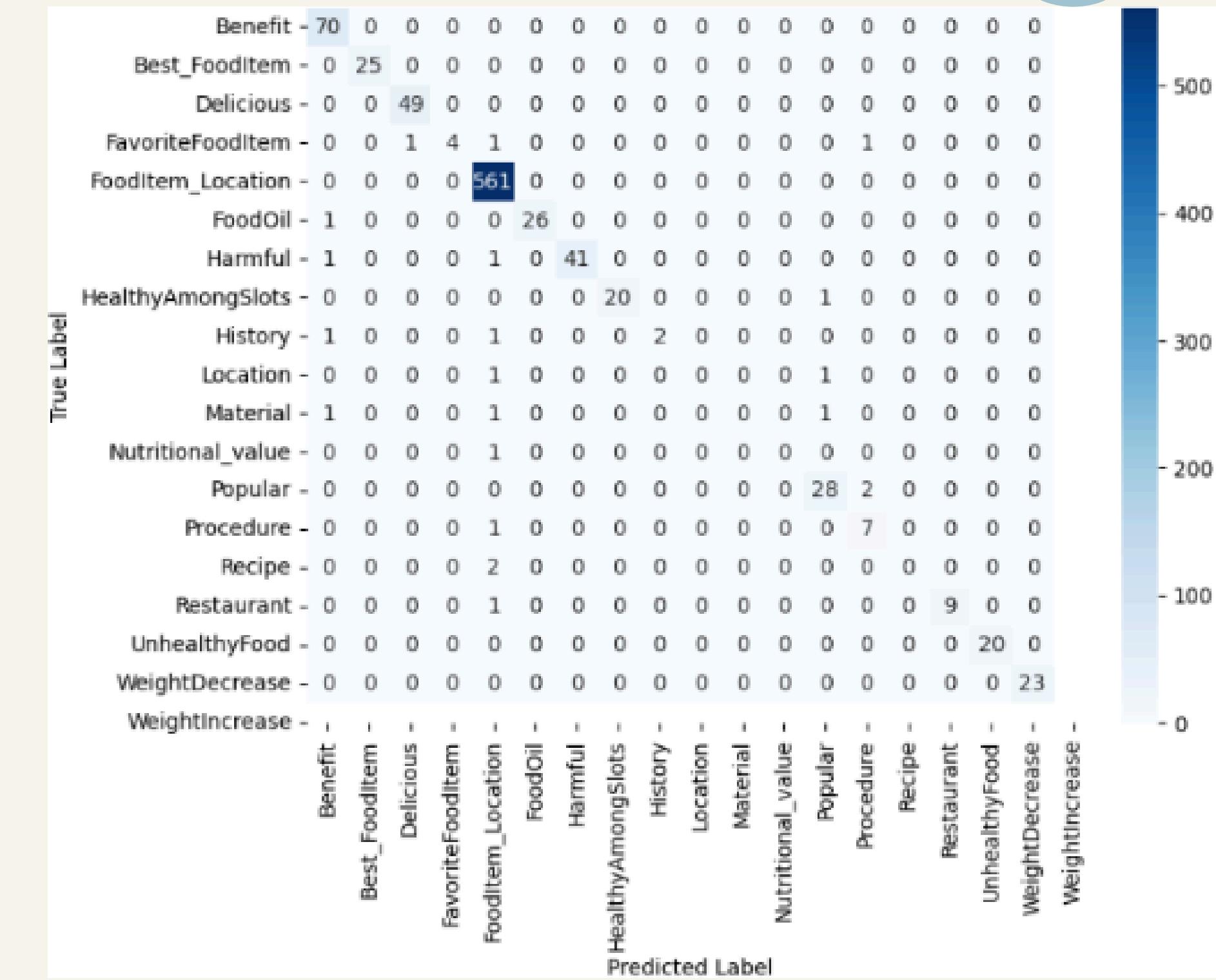


CLASSIFICATION MODELS RESULTS

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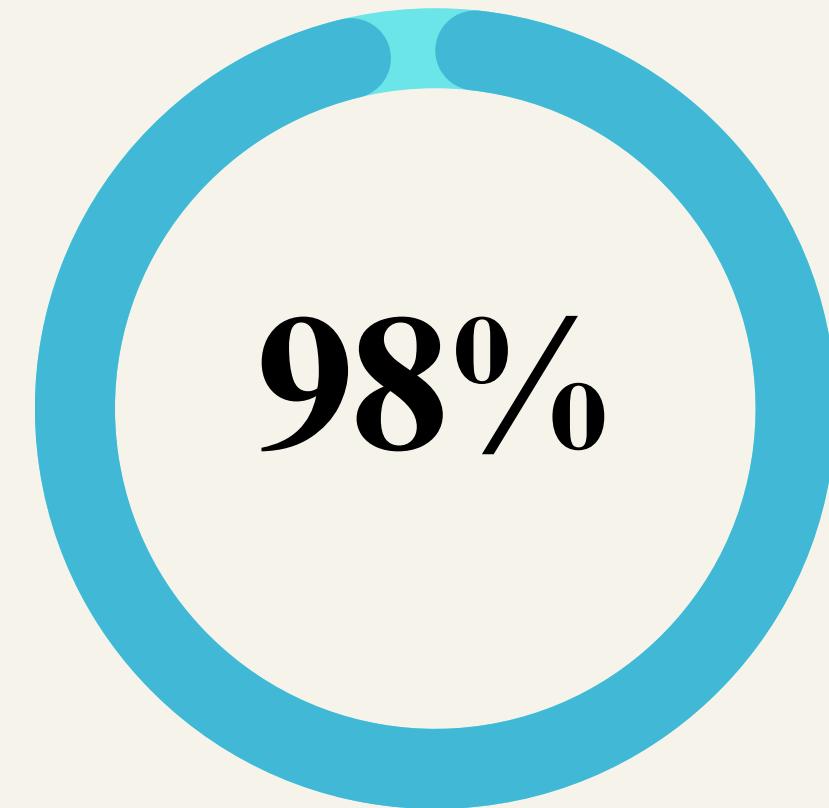


Confusion Matrix For SVM

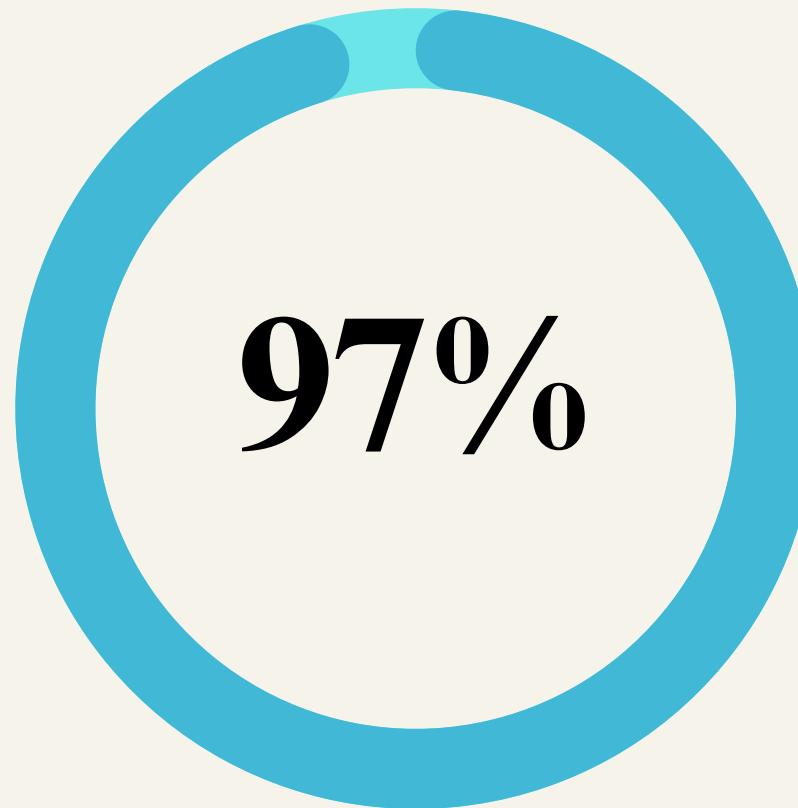


Confusion Matrix For LR

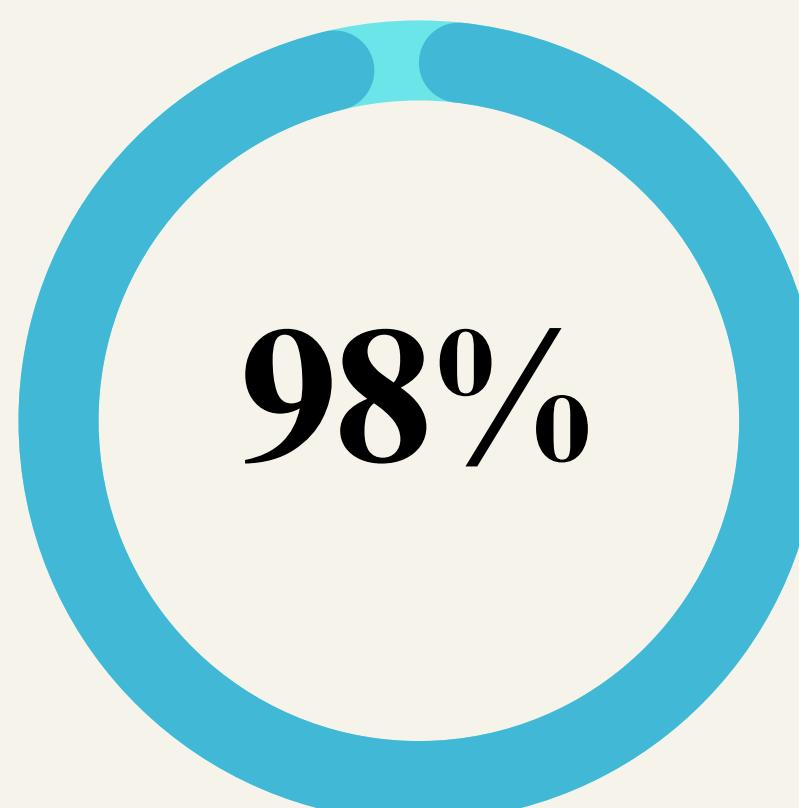
TRANSFORMER MODEL RESULTS



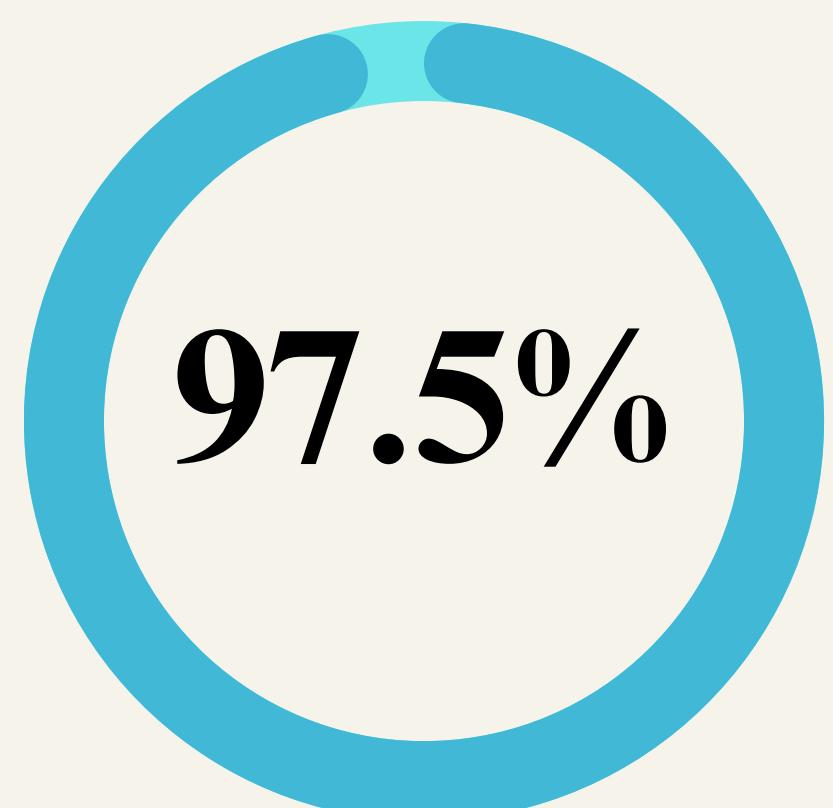
Accuracy



Precision



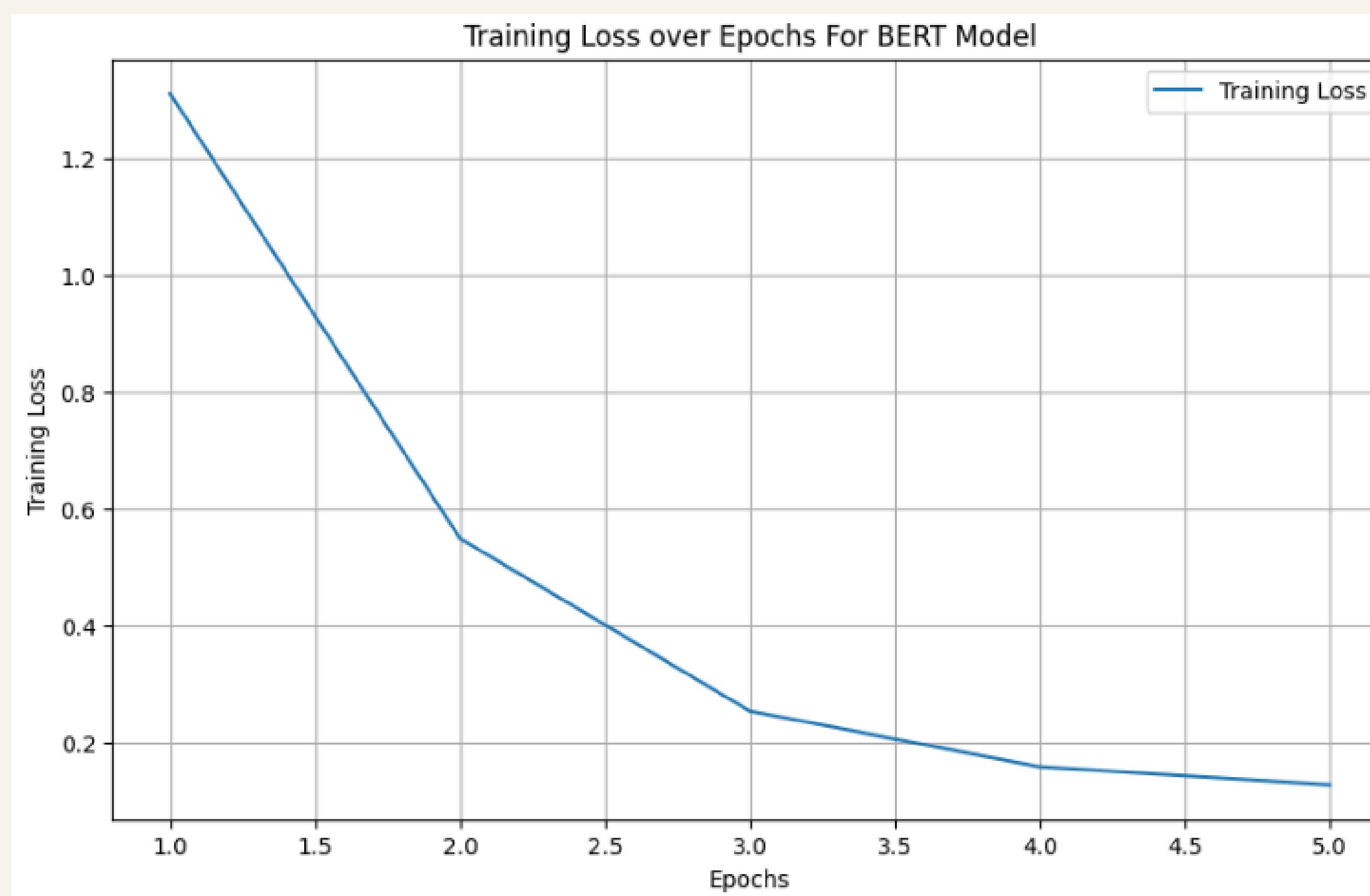
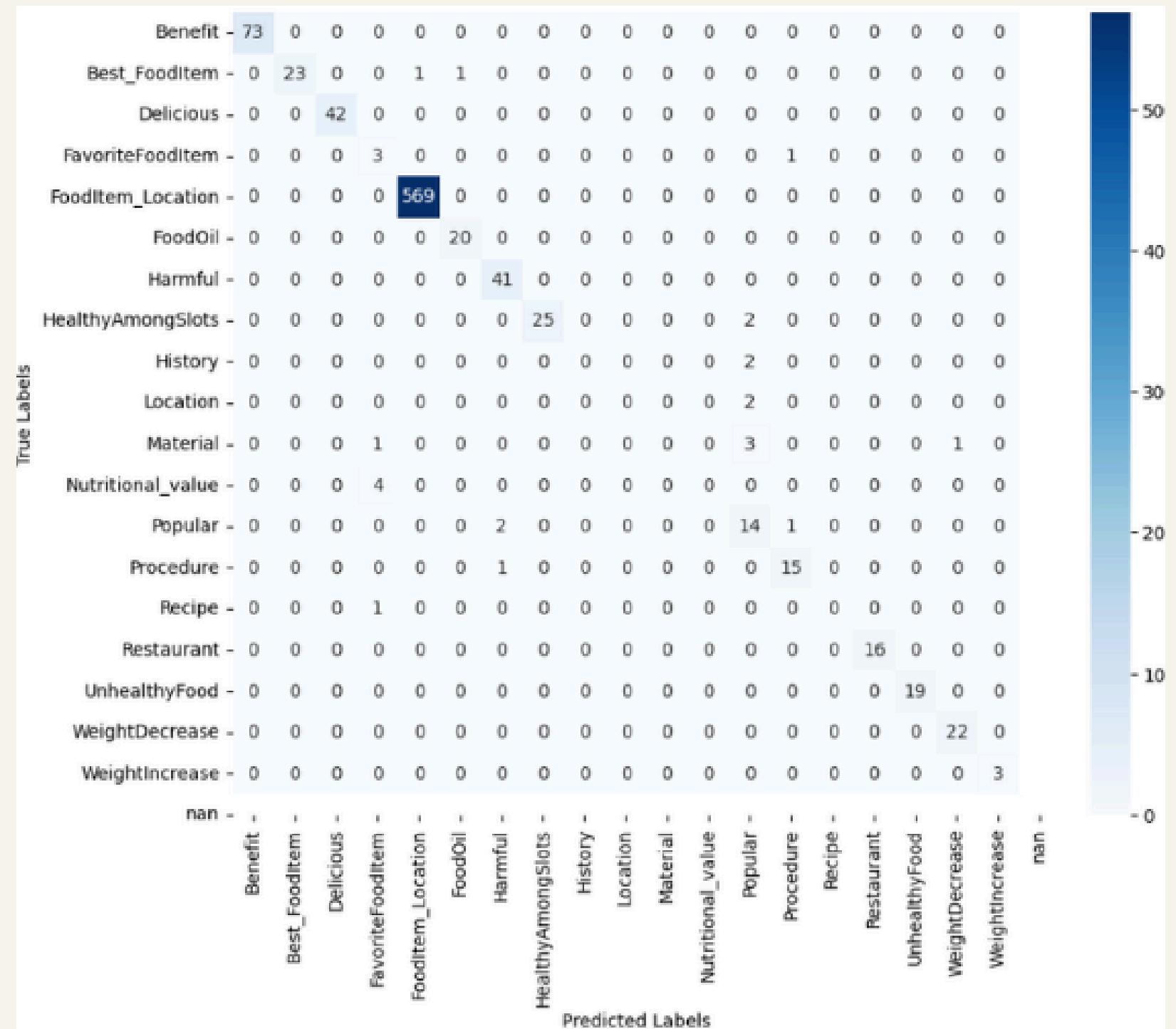
Recall



F1-Score

Note:-These Results of BERT-based Model are Generate After 5 Epoch

TRANSFORMER MODEL RESULTS



CONCLUSION

- This thesis successfully demonstrates the application of BERT and machine learning techniques to enhance intent detection within the Bangla language, specifically tailored for the food domain.
- The work lays a solid foundation for future research .



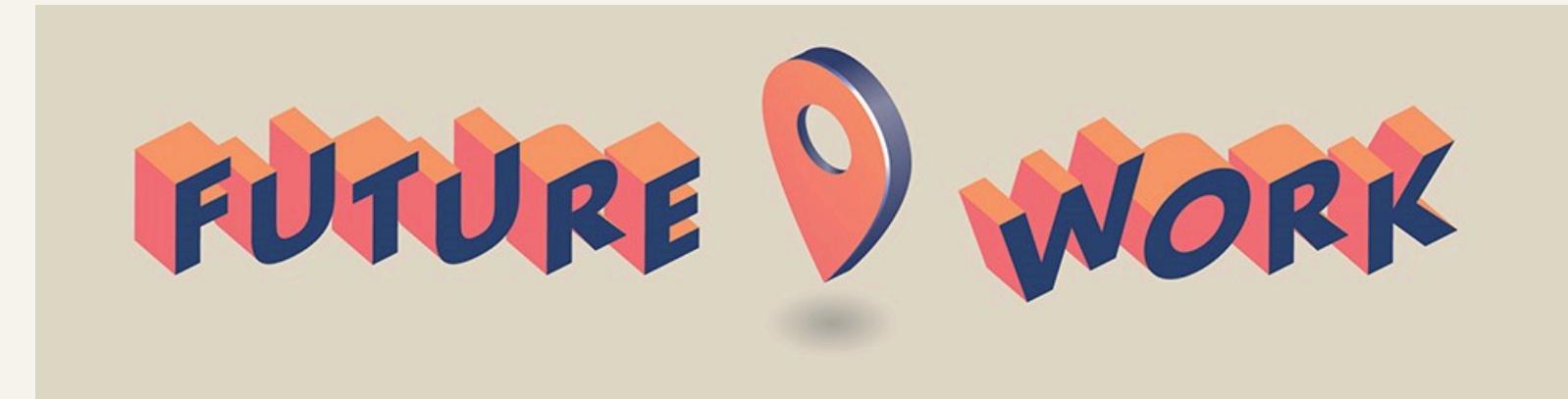
LIMITATIONS

- Language-Specific Challenges
- Model Limitations
- Platform Specificity



FUTURE WORK

- Expanded Dataset Collection
- Use Advanced Model
- Interactive and Real-Time Applications



REFERENCES

<https://dreampuf.github.io/GraphvizOnline>

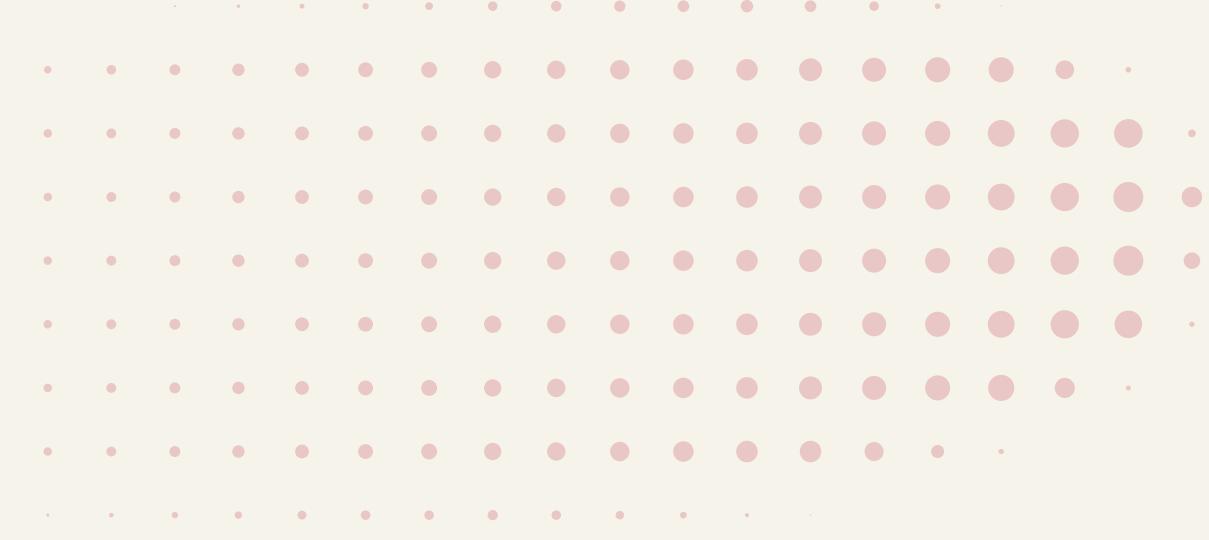
<https://arxiv.org/abs/2310.10935>

<https://arxiv.org/abs/1609.0144>

<https://arxiv.org/abs/1902.10909>

<https://arxiv.org/abs/1909.02188>

<https://www.sciencedirect.com/science/article/abs/pii/S1566253522001671>



**THANK
YOU**



ANY QUESTION?