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REVIEWS TO RATING CONVERSION AND ANALYSIS USING MACHINE

LEARNING TECHNIQUES

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

in

Computer Science

by

Charitha Chanamolu

March 2019

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March 2019

Approved by:

Dr. Owen J. Murphy, Advisor, Computer Science and Engineering

Dr. Ernesto Gomez, Committee Member

Dr. Yunfei Hou, Committee Member

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ABSTRACT

With the advent of technology in recent years, people depend more on online reviews to purchase a product. It is hard to determine whether the product is good or bad from hundreds of mixed reviews. Also, it is very time-consuming to read many reviews. So, opinion mining of reviews is necessary.

The main aim of this project is to convert the reviews of a product into a rating and to evaluate the ratings using machine learning algorithms such as Naïve Bayes and Support Vector Machine. In the process of converting the reviews to a rating, score words are created using SentiWordNet and transformed into seven categories from highly positive to highly negative.

ACKNOWLEDGEMENTS

I would like to express my special thanks and sincere gratitude to my advisor and mentor Dr. Owen J. Murphy who supported me all these days in completing my project and who guided me in my academics as well. I would also like to thank my committee members Dr. Ernesto Gomez and Dr. Yunfei Hou for their valuable suggestions and support.

I would also like to thank my parents Mr. Narasimha Swamy Chanamolu and Mrs. Latha Vallabhaneni and my brother, Suraj Chanamolu for being a part of my journey, supporting and helping me to grow physically and mentally.

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CHAPTER ONE

INTRODUCTION

Background

It is often hard for an individual to come to a conclusion after reading numerous reviews of a product from numerous websites. Sometimes people found the product to be useful while some did not. An individual evaluation of the reviews is required to grade it for a final decision.

Existing System

SentiWordNet is a lexical resource for sentiment analysis. It provides scores to the parts of text based on numbers, adverbs or adjectives. The main drawback with this existing system is that it may not always give a good result for the sentimental analysis.

Disadvantages of the Existing System

- It is difficult to find whether the outcome is positive or negative from the scores obtained from SentiWordNet.
- There is no performance evaluation in the existing system.

CHAPTER TWO

SYSTEM ANALYSIS

Proposed System

The goal of the project is to develop a GUI application where the user can view a final rating of a product, movie or series by selecting the dataset of reviews and running the application.

- This application starts with a Login screen where the user can enter his username and password. If any of the details are missing or incorrect a message box will be displayed.
- After logging in, the user will be able to find the project title at the top panel and seven buttons at the bottom panel namely Load Dictionary, SVM Sentiment Analysis, Naïve Bayes Sentiment Analysis, Confusion Matrix, SVM accuracy, Naïve Bayes accuracy, and Correctly Classified Chart.
- Load dictionary is the main button which contains stop word removal, porter stemmer algorithm, and SentiWordNet. The user should load the dictionary every time they log in.
- Support Vector Machine(SVM) sentiment analysis is used to convert the score obtained from SentiWordNet to a rating. The analysis is done by choosing the required dataset for converting reviews. A table displays on

2

the left panel having the dataset name, review of the product, SVM rating of positive, negative or neutral and the SentiWordNet score.

- Naïve Bayes sentiment analysis is used in converting the score obtained from SentiWordNet into a rating. Naïve Bayes Sentiment Analysis is also done by choosing the required dataset for converting reviews. A table displays on the right panel having the dataset name, review of the product, Naïve Bayes rating of positive, negative and neutral and the SentiWordNet score.
- Confusion matrix contains a table comparing SVM and Naïve Bayes ratings. Both SVM and Naïve Bayes divides the score obtained from SentiWordNet into seven categories from highly positive to highly negative.
- SVM accuracy is the ratio of total positive ratings obtained from the SVM sentiment analysis to the overall scores from the dataset.
- Naïve Bayes is the ratio of the total positive ratings obtained from the Naïve Bayes sentiment analysis to the total ratings from the dataset.
- The Correctly classified chart contains the graphical representation of SVM and Naïve Bayes accuracy.
- Logout terminates the operation from the user.

System Requirement Specifications

The end-user needs to possess the following hardware and software to run the application.

Hardware Requirements

- Laptop having Windows and Eclipse IDE
- RAM-8GB

Software Requirements

- Operating System- Windows 10
- Programming Language- Java
- Toolkit- Java Swing

Programming Used

Graphical User Interface:

In the Graphical User Interface, the user can interact graphically with the screen rather than with the text commands. AWT and Swing are the two sets of Java API for the graphical programming.

<u>Swing</u>

Swing is a part of Java Foundation Classes (JFC) software that implements a set of GUI components. The JFC components are lightweight, and the look and feel of JFC are the same on all platforms. List controls, labels, tree controls, buttons, and table controls are the components included in the swing tool kit.

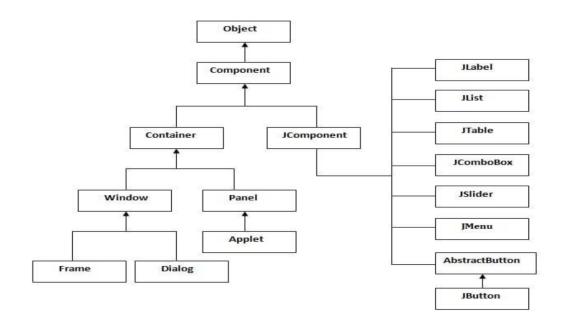


Figure 1. Hierarchy of Java Swing API

<u>SVM</u>

Support Vector Machine (SVM) is used to classify the texts into either positive, negative or neutral. SVM has the distinct advantage of handling large texts. The individual scores obtained for each score word from SentiWordNet are categorized into seven different categories (strong-positive, strong-negative, positive, weak-positive, negative, weak-negative and neutral) using SVM.

```
strong-positive(sp)=score>0.4
```

```
positive(p)=0.3<score<0.4
```

weak-positive(wp)=0.2<score<0.3

strong-negative(sn)=0.1<score<0.2

negative(n)=0<score<0.1

weak-negative(wn)=score<0

neutral(n)=0

Total positive score for a review(t.p)=svm.sp+svm.p+svm.wp

Total negative score for a review(t.n)= svm.sn+svm.n+svm.wn

SVM accuracy=number of positive reviews/(total number of reviews).

Naïve Bayes

Naïve Bayes Sentiment analysis is used to classify the texts into either positive, negative or neutral. Naïve Bayes has the distinct advantage of handling small texts. The individual scores obtained for each score word from SentiWordNet are categorized into seven different categories (strong-positive, strong-negative, positive, weak-positive, negative, weak-negative and neutral) using Naïve Bayes Sentiment analysis.

strong-positive(sp)=score>0.25

positive(p)=0.2<score<0.25

weak-positive(wp)=0.15<score<0.2

strong-negative(sn)=0.1<score<0.15

negative(n)=0<score<0.1

weak-negative(wn)=score<0

neutral(n)=0

Total positive score for a review(t.p)=nb.sp+nb.p+nb.wp

Total negative score for a review(t.n)= nb.sn+nb.n+nb.wn

Naïve Bayes accuracy=number of positive reviews/(total number of reviews)

CHAPTER THREE

SYSTEM DESIGN

UML Diagrams

Use Case Diagram

Use case diagram mainly shows the interactions between user and the system. It gives the clear overview of what steps are going in the system.

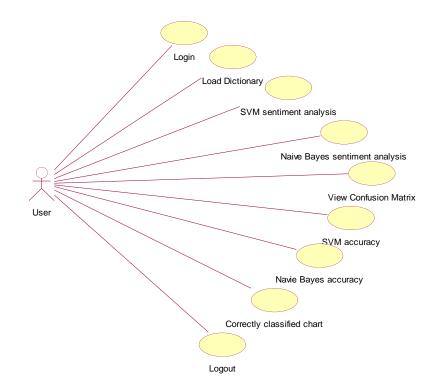


Figure 2. Use Case Diagram for the User

Sequence Diagram

A sequence diagram shows how processes operate with one another and in what order



Figure 3. Sequence Diagram

Data Flow Diagram

A Data Flow Diagram gives the exact information on how the data flows in the system.

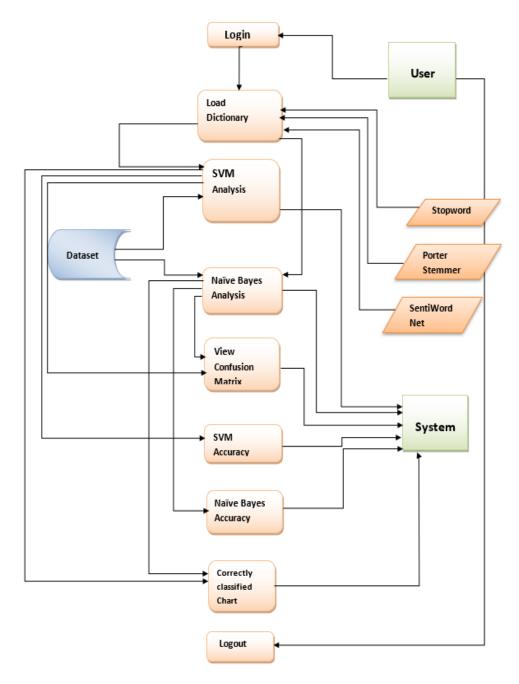


Figure 4. Data Flow Diagram

Activity Diagram

Activity Diagram is a flow chart to represent flow from one activity to another.

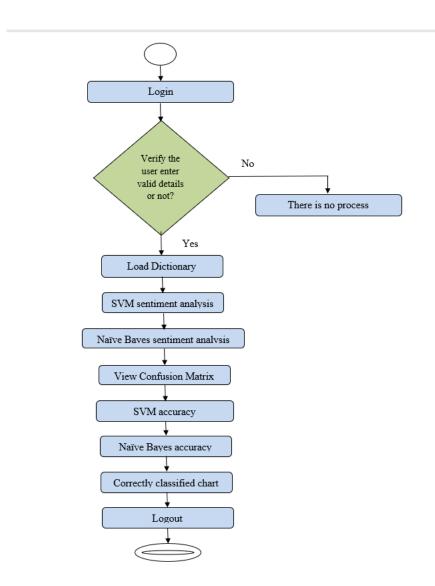


Figure 5. Activity Diagram

Component Diagram

The Component diagram is a special kind of UML diagram that describes the components that are used to form the system. It doesn't give any information about the working of the system.

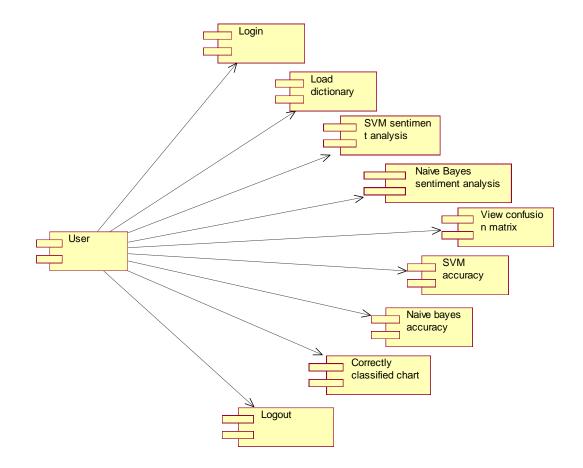


Figure 6. Component Diagram

CHAPTER FOUR

SYSTEM SCREENSHOTS

System Working

Login Screen

At the Login Screen, the user can either login to the application or reset the username and password. A Message box displays if there is any incorrect username or password.

🛓 Lo	ogin		_	\times
L	_ogin Scre	en		
-	Usernam	e		
	Password	i 🦷		
		Login	Reset	

Figure 7. Login Screen

<u>Home Page</u>

This Homepage contains project title on the top panel. Eight buttons in the bottom panel are useful in converting the reviews to a rating.

🛓 Opinio	n Mining							_		\times
Project Title	A NOVEL	APPROACH	FOR S	ENTIWORDNET FOR RE USING WEB DATA	VIEWS	TO RATIN	GS CONVERSION	Ň	_	
File Name	Review	Opinion	Score			File Name	Review		Opinion	Score
						_				
<	Load Dictionary SVM	Sentiment Ana	>	Naive Bayes Sentiment A	nalveie	<	onfusion Matrix	SVM Ac	ansan	>
	Joan Dictionary	Naive Ba	-					SYM AC	curacy	

Figure 8. Home Page

Load Dictionary

Load Dictionary loads stop word removal, the porter stemmer algorithm, and SentiWordNet. It displays a message box when the dictionary is loaded.

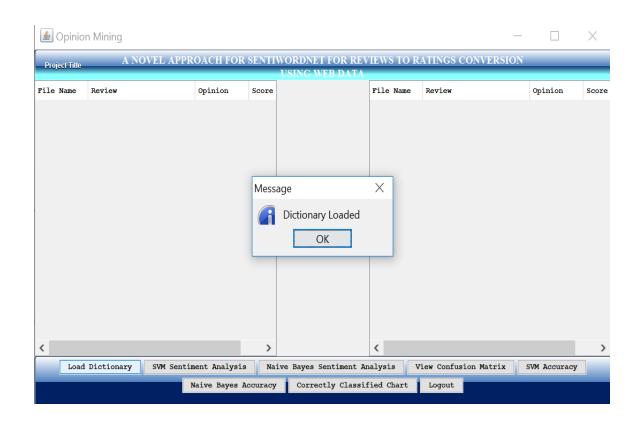


Figure 9. Load Dictionary

SVM Sentiment Analysis

The dataset for which the ratings should be calculated is chosen from the list of the datasets available. Here the dataset containing the reviews of "Bromwell High" which is an animated entertainment series is chosen for SVM Sentiment Analysis.

🛓 Opinio	on Mining			— 🗆	\times
Project Title	A NOVEL APPR	OACH FOR	R SENTI	WORDNET FOR REVIEWS TO RATINGS CONVERSION USING WEB DATA	-
File Name	Review	Opinion	Sce	File Name Review Opinion	Scor
0_9.txt	bromwell high cartoon	Negative	0.2 🔺		
10_9.txt	male women movies spe	Negative	1.4		
11_9.txt	stanley iris acting g	Positive	1.4		
12_9.txt	stanley iris acting g	Positive	1.4		
13_7.txt	production quality ca	Negative	0.9		
14_10.txt	film special place he	Positive	2.4		
15_7.txt	guess film magic don	Negative	0.4		
16_7.txt	found romance drama n	Negative	3.2		
17_9.txt	complex film explores	Negative	-2.		
18_7.txt	stanley iris heart wa	Positive	1.3		
19_10.txt	read comments tomreyn	Negative	2.1		
1_7.txt	adult comedy cartoons	Negative	0.5		
20_9.txt	stanley iris show tri	Positive	3.1 🗸		
<			>	<	>
Load	d Dictionary SVM Sentin	ent Analysi	s Na	ve Bayes Sentiment Analysis View Confusion Matrix SVM Accuracy	
	N	Maive Bayes	Accuracy	Correctly Classified Chart Logout	

Figure 10. SVM Sentiment Analysis for Bromwell High Series

🛓 Opinio	on Mining						—		\times
Project Title	A NOVEL APPROACH	FOR SENT				5 TO RATIN	GS CONVER	SION	
			USIN	G WEB I	DATA	1			_
File Name	Review	Opinion	Score		File Name	Review		Opinion	Score
0_2_1.txt	+ good phone package	Positive	1.0631						
0_2_10.txt	phone features good p	Positive	0.6337						
0_2_2.txt	common belief modern	Neutral	-0.081						
0_2_3.txt	dont buy phone iphone	Negative	-0.613						
0_2_4.txt	phone android device	Negative	0.5708						
0_2_5.txt	bad	Negative	-0.570						
0_2_6.txt	dont buy phone iphone	Negative	-0.613						
0_2_7.txt	phone price isway hig	Negative	0.0454						
0_2_8.txt	phone hangs quick sud	Neutral	0.0319						
0_2_9.txt	phone features good t	Neutral	0.7237						
	1								
<			>		<				>
Lo	ad Dictionary SVM Sent	iment Analy	sis N	Maive Bay	ves Sentiment	t Analysis	View Confusi	ion Matrix	
	SVM Accuracy	Naive Baye	s Accura	cy Co	orrectly Clas	sified Chart	Logout		

Figure 11. SVM Sentiment Analysis for Device iPhone 8+

Project Title	A NOVEL APPROACH	I OK SEIG		G WEB I					SIGI	_
File Name	Review	Opinion	Score		Fil	le Name	Review		Opinion	Scor
_3_1.txt	pretty spot time reme	Positive	2.3187							
_3_10.txt	batman	Positive	0.0							
0_3_11.txt	perfection movie	Positive	0.0							
_3_12.txt	brilliant haunting sa	Positive	0.2815							
_3_13.txt	stupendous effort nee	Neutral	0.0							
_3_2.txt	im gonna start love m	Neutral	0.6767							
]_3_3.txt	couldn dark knight li	Negative	1.5013							
]_3_4.txt	dark complex ambitiou	Neutral	1.8771							
]_3_5.txt	dark knight years ago	Negative	-0.372							
]_3_6.txt	leave theatre highly	Positive	5.6453							
_3_7.txt	honor watching tdk sc	Positive	4.7907							
3_8.txt	comic movie	Positive	0.3333							
]_3_9.txt	dark knight good easi	Positive	0.7856							
<			>		<					
Lo	ad Dictionary SVM Sent	iment Analy	sis 1	Maive Bay	/es	Sentiment	t Analysis	View Confus	ion Matrix	1

Figure 12. SVM Sentiment Analysis for Dark Knight Movie

Naïve Bayes Sentiment Analysis

The dataset for which the ratings should be calculated is chosen from the list of datasets available. Here the dataset containing the reviews of iPhone 8+ is chosen for Naïve Bayes Sentiment Analysis.

Project Title	A NOVEL AI I KOACI	TOK SENTI		G WEB		5 TO RATINGS CONVER	5101	_
File Name	Review	Opinion	Score		File Name	Review	Opinion	Scor
0_2_1.txt	+ good phone package	Positive	1.0631		0_2_1.txt	+ good phone package	Positive	1.06
0_2_10.txt	phone features good p	Positive	0.6337		0_2_10.txt	phone features good p	Positive	0.63
0_2_2.txt	common belief modern	Neutral	-0.081		0_2_2.txt	common belief modern	Neutral	-0.08
0_2_3.txt	dont buy phone iphone	Negative	-0.613		0_2_3.txt	dont buy phone iphone	Negative	-0.6
0_2_4.txt	phone android device	Negative	0.5708		0_2_4.txt	phone android device	Positive	0.57
0_2_5.txt	bad	Negative	-0.570		0_2_5.txt	bad	Negative	-0.5
0_2_6.txt	dont buy phone iphone	Negative	-0.613		0_2_6.txt	dont buy phone iphone	Negative	-0.6
0_2_7.txt	phone price isway hig	Negative	0.0454		0_2_7.txt	phone price isway hig	Negative	0.04
0_2_8.txt	phone hangs quick sud	Neutral	0.0319		0_2_8.txt	phone hangs quick sud	Neutral	0.03
0_2_9.txt	phone features good t	Neutral	0.7237		0_2_9.txt	phone features good t	Neutral	0.72
			>		<			

Figure 13. Naïve Bayes Sentiment Analysis for Device iPhone 8+

Project Title	A NOVEL AIT K	OACH I O	K SLIVII	G WEB DATA	RATINGS CONVERSION		_
File Name	Review	Opinion	Sec	File Name	Review	Opinion	See
0_9.txt	bromwell high cartoon	Negative	0.2 🔺	0_9.txt	bromwell high cartoon	Negative	0.2
10_9.txt	male women movies spe	Negative	1.4	10_9.txt	male women movies spe	Negative	1.4
11_9.txt	stanley iris acting g	Positive	1.4	11_9.txt	stanley iris acting g	Positive	1.4
12_9.txt	stanley iris acting g	Positive	1.4	12_9.txt	stanley iris acting g	Positive	1.4
13_7.txt	production quality ca	Negative	0.9	13_7.txt	production quality ca	Negative	0.9
14_10.txt	film special place he	Positive	2.4	14_10.txt	film special place he	Positive	2.4
15_7.txt	guess film magic don	Negative	0.4	15_7.txt	guess film magic don	Negative	0.4
16_7.txt	found romance drama n	Negative	3.2	16_7.txt	found romance drama n	Negative	3.2
17_9.txt	complex film explores	Negative	-2.	17_9.txt	complex film explores	Negative	-2.
18_7.txt	stanley iris heart wa	Positive	1.3	18_7.txt	stanley iris heart wa	Positive	1.3
19_10.txt	read comments tomreyn	Negative	2.1	19_10.txt	read comments tomreyn	Negative	2.1
1_7.txt	adult comedy cartoons	Negative	0.5	1_7.txt	adult comedy cartoons	Negative	0.5
20_9.txt	stanley iris show tri	Positive	3.1 🗸	20_9.txt	stanley iris show tri	Positive	3.1
<			>	<			>

Figure 14. Naïve Bayes Sentiment Analysis for Bromwell High Series

Project Title	A NOVEL APPR	DACH FOR	SENTIV	DNET FOR REVIEWS TO NG WEB DATA	RATINGS CONVERSION	_	_
File Name	Review	Opinion	Score	File Name	Review	Opinion	Scor
0_3_1.txt	pretty spot time reme	Positive	2.3187	0_3_1.txt	pretty spot time reme	Positive	2.318
0_3_10.txt	batman	Positive	0.0	0_3_10.txt	batman	Positive	0.0
0_3_11.txt	perfection movie	Positive	0.0	0_3_11.txt	perfection movie	Positive	0.0
0_3_12.txt	brilliant haunting sa	Positive	0.2815	0_3_12.txt	brilliant haunting sa	Positive	0.281
0_3_13.txt	stupendous effort nee	Neutral	0.0	0_3_13.txt	stupendous effort nee	Neutral	0.0
0_3_2.txt	im gonna start love m	Neutral	0.6767	0_3_2.txt	im gonna start love m	Neutral	0.676
0_3_3.txt	couldn dark knight li	Negative	1.5013	0_3_3.txt	couldn dark knight li	Negative	1.501
0_3_4.txt	dark complex ambitiou	Neutral	1.8771	0_3_4.txt	dark complex ambitiou	Neutral	1.877
0_3_5.txt	dark knight years ago	Negative	-0.372	0_3_5.txt	dark knight years ago	Negative	-0.37
0_3_6.txt	leave theatre highly	Positive	5.6453	0_3_6.txt	leave theatre highly	Positive	5.645
0_3_7.txt	honor watching tdk sc	Positive	4.7907	0_3_7.txt	honor watching tdk sc	Positive	4.790
0_3_8.txt	comic movie	Positive	0.3333	0_3_8.txt	comic movie	Positive	0.333
0_3_9.txt	dark knight good easi	Positive	0.7856	0_3_9.txt	dark knight good easi	Positive	0.785
<			>	<)
Load	Dictionary SVM Sentim	ent Analysis	Nai	yes Sentiment Analysis	View Confusion Matrix	SVM Accuracy	,

Figure 15. Naïve Bayes Sentiment Analysis for Dark Knight Movie.

Confusion Matrix

SVM and Naïve Bayes Sentiment Analysis divides the given review into seven categories from strong positive to strong negative. The Confusion matrix here is the comparison of ratings between SVM and Naïve Bayes for any dataset of reviews.

SVM	1			Strong Positive		Weak Negative	Strong Negativ
	4	0	2	7	0	0	1
Naive Bayes	4	2	0	7	0	0	1

Figure 16. Confusion Matrix for a Review in the Dataset of Bromwell High

SVM Accuracy

SVM accuracy is the ratio of total positive ratings in the dataset of reviews to the total reviews. The below figure shows that there is only 10.8 percent of positive reviews for the Bromwell High animated series.

Project Title	A NOVEL AFTKOA	CHITOK SEI		NG WE		S TO RATINGS CONVER	SIGN	_
File Name	Review	Opinion	Score		File Name	Review	Opinion	Score
0_9.txt	bromwell high cartoon	Negative	0.2725	^	0_9.txt	bromwell high cartoon	Negative	0.2725
10_9.txt	male women movies spe	Negative	1.4440		10_9.txt	male women movies spe	Negative	1.4440
11_9.txt	stanley iris acting g	Positive	1.4987		11_9.txt	stanley iris acting g	Positive	1.4987
12_9.txt	stanley iris acting g	Positive	1.4987		12_9.txt	stanley iris acting g	Positive	1.4987
13_7.txt	production quality ca	Neg Message				X :ion quality ca	Negative	0.9220
14_10.txt	film special place he	Pos				pecial place he	Positive	2.4169
15_7.txt	guess film magic don	Neg 📄 SV	/M Accu	racy 0.1	08108108108	10811 Film magic don	Negative	0.4386
16_7.txt	found romance drama n	Neg	-	OK		comance drama n	Negative	3.2179
17_9.txt	complex film explores	Neguerre	2.721		±/	comprex film explores	Negative	-2.427
18_7.txt	stanley iris heart wa	Positive	1.3545		18_7.txt	stanley iris heart wa	Positive	1.3545
19_10.txt	read comments tomreyn	Negative	2.1026		19_10.txt	read comments tomreyn	Negative	2.1026
1_7.txt	adult comedy cartoons	Negative	0.5932		1_7.txt	adult comedy cartoons	Negative	0.5932
20_9.txt	stanley iris show tri	Positive	3.1081	~	20_9.txt	stanley iris show tri	Positive	3.1081
<			>		<			>

Figure 17. SVM Accuracy for Bromwell High Animated Series

Project Title				USING WEB DATA		ATINGS CONVERSION		_
File Name	Review	Opinion	Score	Fi	ile Name	Review	Opinion	Scor
0_3_1.txt	pretty spot time reme	Positive	2.3187	0_3	3_1.txt	pretty spot time reme	Positive	2.318
0_3_10.txt	batman	Positive	0.0	0_3	3_10.txt	batman	Positive	0.0
0_3_11.txt	perfection movie	Positive	0.0	0_3	3_11.txt	perfection movie	Positive	0.0
0_3_12.txt	brilliant haunting sa	Positive	0.2815	0_3	3_12.txt	brilliant haunting sa	Positive	0.281
0_3_13.txt	stupendous effort nee			-	 ×	stupendous effort nee	Neutral	0.0
_3_2.txt	im gonna start love m	Neutral Mess	age		~	im gonna start love m	Neutral	0.67
0_3_3.txt	couldn dark knight li	Negativ 🕝	SVM	Accuracy 0.846153846	1538461	couldn dark knight li	Negative	1.501
0_3_4.txt	dark complex ambitiou	Neutral		ОК		dark complex ambitiou	Neutral	1.877
0_3_5.txt	dark knight years ago	Negativ			_	dark knight years ago	Negative	-0.31
0_3_6.txt	leave theatre highly	Positive	5.6453	0_3	3_6.txt	leave theatre highly	Positive	5.645
0_3_7.txt	honor watching tdk sc	Positive	4.7907	0_3	3_7.txt	honor watching tdk sc	Positive	4.790
0_3_8.txt	comic movie	Positive	0.3333	0_3	3_8.txt	comic movie	Positive	0.333
0_3_9.txt	dark knight good easi	Positive	0.7856	0_	3_9.txt	dark knight good easi	Positive	0.785
<			>	<				2

Figure 18. SVM Accuracy for Dark Knight Movie

Project Title	A NOVEL APPR	UACH FUR	SENTI	USING WEB DATA	VIE WS	5101	RATINGS CONVERSION	_	_
File Name	Review	Opinion	Score		File	Name	Review	Opinion	Scor
0_2_1.txt	+ good phone package	Positive	1.0631		0_2_1	txt	+ good phone package	Positive	1.06
0_2_10.txt	phone features good p	Positive	0.6337		0_2_10).txt	phone features good p	Positive	0.63
0_2_2.txt	common belief modern	Neutral	-0.081		0_2_2	txt	common belief modern	Neutral	-0.0
0_2_3.txt	dont buy phone iphone	Negative	-0.613		0_2_3	txt	dont buy phone iphone	Negative	-0.6
0_2_4.txt	phone android device	Negative			X	txt	phone android device	Positive	0.57
0_2_5.txt	bad	Negative	Messa	age	~	txt	bad	Negative	-0.5
0_2_6.txt	dont buy phone iphone	Negative		SVM Accuracy 0.5		txt	dont buy phone iphone	Negative	-0.6
0_2_7.txt	phone price isway hig	Negative		ОК		txt	phone price isway hig	Negative	0.04
0_2_8.txt	phone hangs quick sud	Neutral				txt	phone hangs quick sud	Neutral	0.03
0_2_9.txt	phone features good t	Neutral	0.7237		0_2_9	txt	phone features good t	Neutral	0.72
<			>		<				
	Dictionary SVM Sentin	ment Analysis		ve Bayes Sentiment A		_	View Confusion Matrix	SVM Accuracy	_

Figure 19. SVM Accuracy for iPhone 8+

Naïve Bayes Accuracy

Naïve Bayes Accuracy is the ratio of total positive ratings in the dataset of reviews to the total reviews. The below figure shows that there are 84.61 percent positive reviews for the movie Dark Knight.

Project Title	A NOVEL AFFR	UACHTUK	SENTI	ORDNET FOR REVIEWS TO F USING WEB DATA	CONVERSION	_	_
File Name	Review	Opinion	Score	File Name	Review	Opinion	Scor
0_3_1.txt	pretty spot time reme	Positive	2.3187	0_3_1.txt	pretty spot time reme	Positive	2.31
0_3_10.txt	batman	Positive	0.0	0_3_10.txt	batman	Positive	0.0
0_3_11.txt	perfection movie	Positive	0.0	0_3_11.txt	perfection movie	Positive	0.0
0_3_12.txt	brilliant haunting sa	Positive	0.2815	0_3_12.txt	brilliant haunting sa	Positive	0.28
0_3_13.txt	stupendous effort nee				pendous effort nee	Neutral	0.0
0_3_2.txt	im gonna start love m	Neu Message	9		gonna start love m	Neutral	0.67
0_3_3.txt	couldn dark knight li	Neg 🜈 N	laive Ba	es Accuracy 0.84615384615384	61 ldn dark knight li	Negative	1.50
0_3_4.txt	dark complex ambitiou	Neu		OK	k complex ambitiou	Neutral	1.87
0_3_5.txt	dark knight years ago	Neg			k knight years ago	Negative	-0.3
0_3_6.txt	leave theatre highly	Positive	5.6453	0_3_6.txt	leave theatre highly	Positive	5.64
0_3_7.txt	honor watching tdk sc	Positive	4.7907	0_3_7.txt	honor watching tdk sc	Positive	4.790
0 3 8.txt	comic movie	Positive	0.3333	0_3_8.txt	comic movie	Positive	0.333
	dark knight good easi	Positive	0.7856	0_3_9.txt	dark knight good easi	Positive	0.78
)_3_9.txt							

Figure 20. Naïve Bayes Accuracy for the Movie Dark Knight

Project Title	A NOVEL APPROA	CH FOR SE				WS TO RAT	INGS CONVER	SION	
			USI	NG V	VEB DATA				
File Name	Review	Opinion	Score		File Name	Review		Opinion	Score
0_9.txt	bromwell high cartoon	Negative	0.2725	^	0_9.txt	bromwell	high cartoon	Negative	0.2725
10_9.txt	male women movies spe	Negative	1.4440		10_9.txt	male wome	n movies spe	Negative	1.4440
11_9.txt	stanley iris acting g	Positive	1.4987		11_9.txt	stanley i	ris acting g	Positive	1.4987
12_9.txt	stanley iris acting g	Positive	1.4987		12_9.txt	stanley i	ris acting g	Positive	1.4987
13_7.txt	production quality ca	Message				×	quality ca	Negative	0.9220
14_10.txt	film special place he	message				~~	al place he	Positive	2.4169
15_7.txt	guess film magic don	🛛 😭 Naiv	e Bayes A	CCUT	acy 0.15315315	315315314	magic don	Negative	0.4386
16_7.txt	found romance drama n		Ĩ	(ОК		nce drama n	Negative	3.2179
17_9.txt	complex film explores	negacire	2.327		±/_/. UAU	COMPTON 1	Im explores	Negative	-2.427
18_7.txt	stanley iris heart wa	Positive	1.3545		18_7.txt	stanley i	ris heart wa	Positive	1.3545
19_10.txt	read comments tomreyn	Negative	2.1026		19_10.txt	read comm	ents tomreyn	Negative	2.1026
1_7.txt	adult comedy cartoons	Negative	0.5932		1_7.txt	adult com	edy cartoons	Negative	0.5932
20_9.txt	stanley iris show tri	Positive	3.1081	~	20_9.txt	stanley i	ris show tri	Positive	3.1081
<		1	>		<			1	>
Load Di	ctionary SVM Sentiment	Analysis	Naive B	ayes	Sentiment Analy	sis View	Confusion Matr	ix SVM J	Accuracy

Figure 21. Naïve Bayes Accuracy for the Bromwell High Series

Project Title	A NOVEL APPR	JACH FOR	SENTIV	WORDNET FOR REV	VIEWS) TO F	RATINGS CONVERSION		_
File Name	Review	Opinion	Score	USING WEB DATA	File 1	Name	Review	Opinion	Scor
2_1.txt	+ good phone package	-	1.0631		021.	txt	+ good phone package	-	1.06
 2 10.txt	phone features good p		0.6337		0 2 10		phone features good p		0.63
 2 2.txt	common belief modern		-0.081		022.		common belief modern		-0.0
 2 3.txt	dont buy phone iphone	Negative	-0.613		023.		dont buy phone iphone	Negative	-0.6
) 2 4.txt	phone android device	-				txt	phone android device	Positive	0.57
2 5.txt	bad	Negative	Messa	ige	je X txt bad		bad	Negative	-0.5
2_6.txt	dont buy phone iphone	Negative		Naive Bayes Accurac	y 0.6	txt	dont buy phone iphone	Negative	-0.6
	phone price isway hig	Negative		OK		txt	phone price isway hig	Negative	0.04
_2_8.txt	phone hangs quick sud	Neutral		UK		txt	phone hangs quick sud	Neutral	0.03
_2_9.txt	phone features good t	Neutral	0.7237		0_2_9.	txt	phone features good t	Neutral	0.72
<			>		<				
	Dictionary SVM Sentim			ve Bayes Sentiment A			View Confusion Matrix	SVM Accuracy	_

Figure 22. Naïve Bayes Accuracy for the Device iPhone 8+

Correctly Classified Chart

The correctly classified chart contains graphical representation of SVM and Naïve Bayes accuracy. The below figure shows the Correctly Classified Chart for Bromwell high animated series.

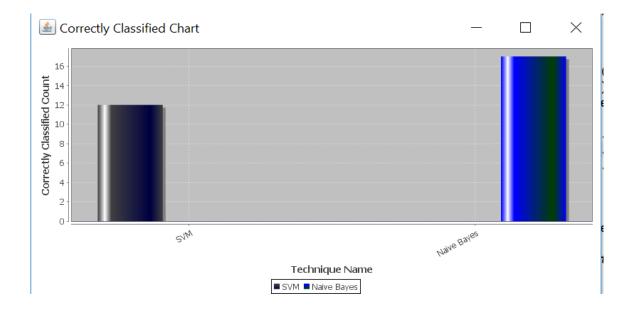


Figure 23. Correctly Classified Chart

CHAPTER FIVE

SYSTEM TESTING

Testing has become a fundamental part of product development and equally important to application development. Testing is done to verify the quality of the product. It also decreases the maintenance cost of the product. A User acceptance test is conducted with nine test cases to ensure proper working of the application.

User Acceptance Testing

In this testing, all the components are equally verified. A total of nine test cases are verified at each level of the application starting from login page to the logout.

Test Cases

Test	Test Case	Test Case Disc.	Test Steps			Test	Test
Cas	Name		Step	Expected	Actual	Case	Priori
e Id			•	•		Status	ty
01	Login	Verify either user data is uploaded or not	lf data is not uploaded	We cannot get further operations	Logging successfully	High	High
02	Load Dictionary	Verify the dictionary is loaded or not	If it's not loaded	We cannot get the parts of speech from words	Dictionary loaded	High	High

Table 1. User Acceptance Testing

03	SVM Sentiment Analysis	Verify the dataset is loaded or not	lf it's not loaded	We cannot discover the opinions	Displaying sentiment results for each review with scores	High	High
04	Naïve Bayes Sentiment Analysis	Verify the dataset is loaded or not	If it's not loaded	We cannot discover the opinions	Displaying sentiment results from Naïve Bayes algorithm	High	High
05	View Confusion Matrix	Verify any one row is selected or not	If it's not selected	We cannot apply the confusion matrix	Get the count of 7 types	High	High
06	SVM Accuracy	Verify any one row is selected or not	If it's not selected	We cannot apply the confusion matrix	Displays the SVM accuracy	High	High
07	Naïve Bayes Accuracy	Verify any one row is selected or not	If it's not selected	We cannot apply the confusion matrix	Displays the Naïve Bayes accuracy	High	High
08	Correctly Classified Chart	Verify the SVM & Naïve Bayes datasets exist or not	If it's not existed	We cannot get the chart	Display the chart for no of positive reviews discover from each algorithm	High	High
09	Logout	Verify all the operations are completed or not	If it's not complete	We cannot exit	Logout from the screen	High	High

CHAPTER SIX

CONCLUSION

This project will be useful for people in making decisions based on online reviews that are incorporated in the review section of websites.

The proposed approach has been tested successfully on the reviews for an animated entertainment series which has the least rating, a device which has a neutral rating and from a movie which has high ratings.

Future Enhancements

Context-Based Sentiment Analysis

SentiWordNet cannot identify the context of the sentence. SentiWordNet can misjudge a positive sentence as a negative or vice versa without considering the context. The accuracy of the current rating system can be improved by considering the context of the sentence. APPENDIX A

APPLICATION CODE

Code

package com;

import javax.swing.JFrame;

import javax.swing.JLabel;

import javax.swing.JTextField;

import javax.swing.JButton;

import javax.swing.JPanel;

import java.awt.event.ActionEvent;

import java.awt.event.ActionListener;

import javax.swing.UIManager;

import java.awt.BorderLayout;

import java.awt.Dimension;

import java.awt.Color;

import java.awt.Font;

import javax.swing.JPasswordField;

import javax.swing.JOptionPane;

import com.jd.swing.custom.component.panel.HeadingPanel;

import com.jd.swing.util.PanelType;

import com.jd.swing.util.Theme;

public class Login extends JFrame

{

CUSTOMPANEL P1;

JLabel I1,I2;

- JTextField tf1,tf2;
- JButton b1,b2;

Font f1;

public Login(){

super("Login ");

p1 = new CustomPanel("LoginScreen");

p1.setTitle("Login Screen");

p1.setLayout(null);

JPanel main = new

HeadingPanel("",Theme.GLOSSY_METALIC_BLUE_THEME);

main.setLayout(new BorderLayout());

f1 = new Font("Microsoft Sanserif",Font.BOLD,13);

JPanel pan1 = new

HeadingPanel("",Theme.GLOSSY_METALIC_BLUE_THEME);

I1 = new JLabel("Username");

I1.setForeground(Color.white);

I1.setFont(f1);

PAN1.ADD(L1);

tf1 = new JTextField(15);

tf1.setFont(f1);

pan1.add(tf1);

JPanel pan2 = new

HeadingPanel("",Theme.GLOSSY_METALIC_BLUE_THEME);

I2 = new JLabel("Password");

I2.setForeground(Color.white);

l2.setFont(f1);

pan2.add(l2);

tf2 = new JPasswordField(15);

tf2.setFont(f1);

pan2.add(tf2);

JPanel pan3 = new

HeadingPanel("",Theme.GLOSSY_METALIC_BLUE_THEME);

b1 = new JButton("Login");

b1.setFont(f1);

pan3.add(b1);

b1.addActionListener(new ActionListener(){

public void actionPerformed(ActionEvent ae){

login();

}

});

b2 = new JButton("Reset");

b2.setFont(f1);

pan3.add(b2);

b2.addActionListener(new ActionListener(){

public void actionPerformed(ActionEvent ae){

tf1.setText("");

tf2.setText("");

}

});

main.add(pan1,BorderLayout.NORTH);

main.add(pan2,BorderLayout.CENTER);

main.add(pan3,BorderLayout.SOUTH);

main.setBounds(50,80,300,100);

p1.add(main);

getContentPane().add(p1,BorderLayout.CENTER);

}

public static void main(String a[])throws Exception{

UIManager.setLookAndFeel(UIManager.getSystemLookAndFeelClassNa me());

```
Login login = new Login();
login.setVisible(true);
login.setSize(400,300);
login.setLocationRelativeTo(null);
login.setResizable(false);
```

}

```
public void clear(){
```

tf1.setText("");

tf2.setText("");

}

```
public void login(){
```

```
String user = tf1.getText();
```

```
String pass = tf2.getText();
```

```
if(user == null || user.trim().length() <= 0){</pre>
```

JOptionPane.showMessageDialog(this,"Username must be

entered");

```
tf1.requestFocus();
```

return;

```
}
```

```
if(pass == null || pass.trim().length() <= 0)
```

{

JOptionPane.showMessageDialog(this,"Password must be entered");

```
tf2.requestFocus();
return;

try{
    if(user.equals("xxxx") && pass.equals("****")){
        setVisible(false);
        UploadDocument ud = new UploadDocument(this);
        ud.setVisible(true);
        ud.setExtendedState(JFrame.MAXIMIZED_BOTH);
    }else{
        JOptionPane.showMessageDialog(this,"invalid user");
    }
}catch(Exception e){
```

e.printStackTrace();

}

}

package com; import javax.swing.JFrame; import javax.swing.JPanel; import javax.swing.JLabel; import java.awt.BorderLayout; import java.awt.Font; import java.awt.Color; import javax.swing.JButton; import java.awt.event.ActionEvent; import java.awt.event.ActionListener; import java.io.BufferedReader; import java.io.FileReader; import java.io.File; import java.util.ArrayList; import javax.swing.JOptionPane; import javax.swing.JScrollPane; import javax.swing.JTable; import javax.swing.table.DefaultTableModel; import javax.swing.table.TableColumn; import javax.swing.JFileChooser; import java.awt.Cursor; import com.jd.swing.custom.component.panel.HeadingPanel; import com.jd.swing.util.PanelType; import com.jd.swing.util.Theme; import java.awt.Dimension; import java.io.BufferedReader; import java.awt.Cursor; public class UploadDocument extends JFrame{

JLabel I1;

JPanel p1,p2,p3,p4;

Font f1;

JScrollPane jsp,jsp1;

Login;

JButton b1,b2,b3,b4,b5,b6,b7,b8;

JFileChooser chooser;

DefaultTableModel dtm,dtm1;

JTable table,table1;

POSModel model;

boolean loaded = false;

SentiWordNetDemoCode sentiwordnet;

SVMAnalysis svm;

NaiveBayes nb;

double svm_accuracy;

double nb_accuracy;

Porter stemmer = new Porter();

ArrayList<Count> svmcount = new ArrayList<Count>();

ArrayList<Count> nbcount = new ArrayList<Count>();

public UploadDocument(Login log){

super("Opinion Mining");

login = log;

p1 = new HeadingPanel("Project Title",Theme.GLOSSY_METALIC_BLUE_THEME);

p1.setPreferredSize(new Dimension(600,50));

I1 = new JLabel("<html><body><center>A Novel approach for SentiWordNet for Reviews to Ratings Conversion
br/>using Web Data</center></body></html>".toUpperCase());

I1.setFont(new Font("Times New Roman",Font.BOLD,18));

I1.setForeground(Color.white);

p1.add(l1);

getContentPane().add(p1,BorderLayout.NORTH);

f1 = new Font("Courier New",Font.BOLD,14);

```
p2 = new JPanel();
p2.setLayout(new BorderLayout());
dtm = new DefaultTableModel(){
      public boolean isCellEditable(int r,int c){
            return false;
      }
};
table = new JTable(dtm);
table.setRowHeight(30);
table.setAutoResizeMode(JTable.AUTO RESIZE OFF);
table.setFont(f1);
table.getTableHeader().setFont(f1);
dtm.addColumn("File Name");
dtm.addColumn("Review");
dtm.addColumn("Opinion");
dtm.addColumn("Score");
table.getColumnModel().getColumn(0).setPreferredWidth(100);
table.getColumnModel().getColumn(1).setPreferredWidth(200);
table.getColumnModel().getColumn(2).setPreferredWidth(100);
table.getColumnModel().getColumn(3).setPreferredWidth(100);
jsp = new JScrollPane(table);
```

p2.add(jsp,BorderLayout.CENTER);

```
p4 = new JPanel();
```

```
p4.setLayout(new BorderLayout());
dtm1 = new DefaultTableModel(){
      public boolean isCellEditable(int r,int c){
            return false;
      }
};
table1 = new JTable(dtm1);
table1.setRowHeight(30);
table1.setAutoResizeMode(JTable.AUTO_RESIZE_OFF);
table1.setFont(f1);
table1.getTableHeader().setFont(f1);
dtm1.addColumn("File Name");
dtm1.addColumn("Review");
dtm1.addColumn("Opinion");
dtm1.addColumn("Score");
table1.getColumnModel().getColumn(0).setPreferredWidth(100);
table1.getColumnModel().getColumn(1).setPreferredWidth(200);
table1.getColumnModel().getColumn(2).setPreferredWidth(100);
table1.getColumnModel().getColumn(3).setPreferredWidth(100);
jsp1 = new JScrollPane(table1);
p4.add(jsp1,BorderLayout.CENTER);
```

```
p3 = new HeadingPanel("",Theme.GLOSSY_METALIC_BLUE_THEME);
p3.setPreferredSize(new Dimension(150,80));
chooser = new JFileChooser(new File("."));
```

chooser.setFileSelectionMode(JFileChooser.DIRECTORIES_ONLY);

b1 = new JButton("Load Dictionary");

b1.setFont(f1);

p3.add(b1);

b1.addActionListener(new ActionListener(){

public void actionPerformed(ActionEvent ae){

try{

if(!loaded){

Cursor hourglassCursor = new

Cursor(Cursor.WAIT_CURSOR);

setCursor(hourglassCursor);

loadDictionary();

svm = new SVMAnalysis();

nb = new NaiveBayes();

sentiwordnet = new SentiWordNetDemoCode("SentiWordNet_3.0.0_20130122.txt");

Stopwords.readWords(stemmer);

Cursor normalCursor = new

Cursor(Cursor.DEFAULT_CURSOR);

setCursor(normalCursor);

}

```
}catch(Exception e){
```

```
e.printStackTrace();
```

}

JOptionPane.showMessageDialog(UploadDocument.this,"Dictionary Loaded");

```
}
```

});

b2 = new JButton("SVM Sentiment Analysis");

b2.setFont(f1);

p3.add(b2);

```
b2.addActionListener(new ActionListener(){
            public void actionPerformed(ActionEvent ae){
                   clearTable();
                   int option = chooser.showOpenDialog(UploadDocument.this);
                   if(option == chooser.APPROVE_OPTION){
                         File = chooser.getSelectedFile();
                         Cursor hourglassCursor = new
Cursor(Cursor.WAIT_CURSOR);
                         setCursor(hourglassCursor);
                         svm(file);
                         Cursor normalCursor = new
Cursor(Cursor.DEFAULT_CURSOR);
                         setCursor(normalCursor);
                   }
            }
      });
      b3 = new JButton("Naive Bayes Sentiment Analysis");
      b3.setFont(f1);
      p3.add(b3);
      b3.addActionListener(new ActionListener(){
            public void actionPerformed(ActionEvent ae){
                   clearTable1();
                   int option = chooser.showOpenDialog(UploadDocument.this);
                   if(option == chooser.APPROVE_OPTION){
                         File = chooser.getSelectedFile();
                         Cursor hourglassCursor = new
Cursor(Cursor.WAIT_CURSOR);
```

```
b4 = new JButton("SVM Accuracy");
```

b4.setFont(f1);

p3.add(b4);

b4.addActionListener(new ActionListener(){

```
public void actionPerformed(ActionEvent ae){
```

double positive = 0;

double negative = 0,nuetral=0;

```
for(int i=0;i<dtm.getRowCount();i++){</pre>
```

String value = dtm.getValueAt(i,2).toString().trim();

if(value.equals("Positive"))

```
positive = positive + 1;
```

if(value.equals("Neutral"))

nuetral=nuetral+1;

}

```
svm_accuracy = (positive+nuetral)/(double)dtm.getRowCount();
```

```
JOptionPane.showMessageDialog(UploadDocument.this,"SVM Accuracy "+svm_accuracy);
```

});

b5 = new JButton("Naive Bayes Accuracy");

b5.setFont(f1);

}

p3.add(b5);

```
b5.addActionListener(new ActionListener(){
```

public void actionPerformed(ActionEvent ae){

double positive = 0;

```
double negative = 0,nuetral=0;
```

```
public void clearTable1(){
       for(int i=table1.getRowCount()-1;i>=0;i--){
              dtm1.removeRow(i);
       }
}
public void svm(File file){
       try{
              svmcount.clear();
              String result = "none";
              File file_list[] = file.listFiles();
              for(int i=0;i<file_list.length;i++){</pre>
                     File fname = file list[i];
                     String review =
svm.analyze(fname.getPath(),model,sentiwordnet,stemmer);
                     Count c = new
Count(review,svm.neutral,svm.wp,svm.p,svm.sp,svm.n,svm.wn,svm.sn,svm.score);
                     svmcount.add(c);
                     int positive = svm.wp+svm.p+svm.sp;
                     int negative = svm.n+svm.wn+svm.sn;
                     int neutral = svm.neutral;
                     if(positive > negative && positive > neutral)
                           result = "Positive";
                     else if(negative > positive && negative > neutral)
                            result = "Negative";
                     else if(neutral > positive && neutral > negative)
                           result = "Neutral";
                     Object row[] = {fname.getName(),review,result,svm.score};
                     dtm.addRow(row);
```

}

```
}catch(Exception e){
              e.printStackTrace();
       }
}
public void naiveBayes(File file){
       try{
              nbcount.clear();
              String result = "none";
              File file list[] = file.listFiles();
              for(int i=0;i<file_list.length;i++){</pre>
                     File fname = file list[i];
                     String review =
nb.analyze(fname.getPath(),model,sentiwordnet,stemmer);
                     Count c = new
Count(review,nb.neutral,nb.wp,nb.p,nb.sp,nb.n,nb.wn,nb.sn,nb.score);
                     nbcount.add(c);
                     int positive = nb.wp+nb.p+nb.sp;
                     int negative = nb.n+nb.wn+nb.sn;
                     int neutral = nb.neutral;
                     if(positive > negative && positive > neutral)
                            result = "Positive";
                     else if(negative > positive && negative > neutral)
                            result = "Negative";
                     else if(neutral > positive && neutral > negative)
                            result = "Neutral";
                     Object row[] = {fname.getName(),review,result,nb.score};
                     dtm1.addRow(row);
              }
```

```
}catch(Exception e){
             e.printStackTrace();
      }
}
public void loadDictionary(){
      Runnable r = new Runnable(){
             public void run(){
                    try{
                           model = new POSModelLoader().load(new File("en-
pos-maxent.bin"));
             }catch(Exception e){
                           e.printStackTrace();
                    }
             }
      };
      new Thread(r).start();
}
}
```

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