



# IJRASET

International Journal For Research in  
Applied Science and Engineering Technology



---

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

---

**Volume:** 10    **Issue:** V    **Month of publication:** May 2022

**DOI:** <https://doi.org/10.22214/ijraset.2022.42099>

[www.ijraset.com](http://www.ijraset.com)

Call:  08813907089

E-mail ID: [ijraset@gmail.com](mailto:ijraset@gmail.com)

# Virtual Shopping Assistant for Online Fashion Store

Prof. Anushree Deshmukh<sup>1</sup>, Smit Shah<sup>2</sup>, Heena Puthran<sup>3</sup>, Naisargi Shah<sup>4</sup>

*Department of Information Technology, Mumbai University, India*

*Manjara Charitable Trust's Rajiv Gandhi Institute of Technology, Mumbai, India.*

**Abstract:** *A new way for individuals to interact with computer systems will be done through chatbots or conversational interfaces. Historically, introducing a matter answered by a software package involves employing a program or filling out a type. The technology at the core of the increase of the chatbot is NLP i.e., Natural Language Processing.*

*Sequence to Sequence (often abbreviated to seq2seq) fashions is a specific type of Recurrent Neural Network architectures that we commonly use (but no longer restricted) to clear up complicated Language issues like Machine Translation, Question Answering, growing Chatbots, Text Summarization, and so forth.*

*Recent advances in machine learning have greatly improved the accuracy and effectiveness of NLP, creating chatbots a viable choice for several organizations like e-commerce, Customer service, Conversational apps, social media, Sales/Marketing/Branding, as Voice modules, Travel industry, Medicine, Hospitality, Human Resources etc. An NLP primarily based chatbot is a pc software or synthetic brain that communicates with a patron by means of textual or sound strategies This improvement in NLP is firing a great deal of additional analysis and research which should lead to continued growth in the effectiveness of chatbots in the years to come.*

*Stochastic gradient descent (often abbreviated SGD) is an iterative approach for optimizing an goal characteristic with appropriate smoothness homes (e.g. differentiable or sub differentiable). Usage of Chatbots can also prove to be beneficial in ways like economically offering 24/7 service, improving customer satisfaction, reaching a younger demographic, reducing costs, increasing revenue and much more.*

**Keywords:** *Chatbots, Natural Language Processing (NLP), Stochastic Gradient Descent (SGD), Sequential Model, Machine Learning.*

## I. INTRODUCTION

Today most websites depend on a menu primarily based on navigation and a search bar to grant data to the user. However, websites with a giant quantity of content material and poorly structured navigation can make it challenging for a person to locate the facts effortlessly and quickly. On occasion, if you reflect on consideration of an online purchasing portal, it has a massive catalog of products. Browsing through the merchandise can be difficult and time-eating given the range of aspects a product can have. To get an extra element of a product, humans are probably to ask alternatively than study the description about it. Virtual Assistants for consumer providers have turned out to be greater and greater famous with customer-oriented businesses. Most of them are constructed from human conversations in the past, which is easy however confronted with troubles of information scale and privacy. Most of the time, clients want to wait in line to get an aid body of a worker's answer, which is much less advantageous and tough to scale up. Meanwhile, clients might also have privacy issues about the conversations, as a result, conversations with clients can't be effortlessly leveraged to teach a chatbot. FAQs are in most cases furnished on the company's internet site to inform their carrier and product. It's simply that the FAQ is normally much less interactive and provides too much data that is much less practical. A chatbot can be used as a choice in supplying FAQs. This is a promising choice in contrast to the usage of search and kind-based tools. It makes it less complicated for the person to locate information. The chatbot has pre-programmed responses, however, it can work with dynamic data from a person's message to make an applicable dialog and endorse applicable information. Given a precise product web page and a purchaser question, the chatbot selects a satisfactory reply from current facts sources. It carries a set of today's NLP and computing devices gaining knowledge of techniques. The two foremost elements in this challenge are the internet site and the chatbot. They are built-in seamlessly to grant a precise personal experience. The product database is impartial to the saved responses; more modern products underneath the respective class can be without problems brought and eliminated and require no amendment of the saved chatbot responses.

## II. RELATED WORKS

The chatbot developed in this project is a First-party chatbot. First-party chatbots refer to conversation engines developed by large enterprises for their own business to improve customer service quality and reduce overall customer service budget like the ‘Super Agent’. It uses sub-engines to filter queries and if the probability of the correctness is maximum, that response is generated to the user. [1] Another use of chatbot developed using ML is to use it as a digital organizer to provide variety of services to its master. It expands its digital abilities to organize events, order food, play music, travelling guide, game prediction etc. [3] When a query is input, the Chatbot calls API of AIML interpreter where the query is processed. AIML Interpreter exams the textual content of entry based totally on understanding in AIML documents uploaded into AIML Interpreter. Every time customers chat with a bot, it calls Pandorabots API. [5] There are a lot of options to choose from, on the internet. Thus, having a chatbot that personalises products and caters to one’s distinct needs can prove to be quite beneficial. This can mean that the bot acts as a personalised assistant. [2] To familiarise civil crowd with one’s features and services, large organisations say, Banks may also put-up FAQs on their websites. This can become tiresome to read and can be enhanced by the use of virtual answering devices. Thus, as suggested by authors in [4] NLP is used so that the system can understand user queries in the form of natural language. Cosine similarity algorithm finds similarities between queries and patterns in the knowledge base. Patterns with the highest cosine values are considered to be most similar to user queries so they can be used as a response to user queries. Parse tree is used to check sentence structure of user query; the meaning of the sentence is deduced here.

## III. PROPOSED WORK

### A. Methodology

- 1) *SGD Algorithm*: The term "stochastic" refers to a system or process that has a random probability associated with it. As a result, instead of selecting the entire data set for each iteration in Stochastic Gradient Descent, a few samples are chosen at random. The term "batch" is used in Gradient Descent to refer to the total number of samples from a dataset that are utilized to calculate the gradient for each iteration. The batch is taken to be the entire dataset in standard Gradient Descent optimization, such as Batch Gradient Descent. While using the entire dataset is really valuable for arriving to the minima in a less noisy and random manner, the challenge occurs when our datasets become large. If one's dataset contains a million samples, then using a standard Gradient Descent optimization technique, one must use all one million samples to complete one iteration of the Gradient Descent, and this must be done for each iteration until the minima are achieved. The use of SGD Classifier(loss='log') outcomes in logistic regression, i.e. a mannequin equal to Logistic Regression which is geared up with the aid of SGD alternatively of being geared up via one of the different solvers in Logistic Regression. Similarly, SGRegressor(loss='squared\_error', penalty='l2') & Ridge clear up the identical optimization problem, by way of unique means.
  - a) *Natural Language Processing (NLP)*: NLP stands for Natural Language Processing. Using NLP technology, you can assist a computer recognize human speech and spoken words. NLP combines computational linguistics that is the rule-based modelling of the human spoken language with smart algorithms such as statistical, machine, and deep mastering algorithms. There are a variety of human errors, differences, and extraordinary intonations that human beings use each and every day in their speech. NLP science permits the computer to understand, process, and reply to massive volumes of textual content unexpectedly in real-time. In day-to-day life, you have encountered NLP tech in voice-guided GPS apps, digital assistants, speech-to-text word advent apps, and different app aid chatbots. This tech has located sizeable use instances in the enterprise sphere the place it’s used to streamline processes, display worker productivity, and extend income and after-sales efficiency.
  - b) *Classification*: The classification SGD Classifier implements an undeniable stochastic gradient descent getting to know pursuits which helps one of a kind loss features and penalties for classification. Below is the choice boundary of a SGD Classifier educated with the hinge loss, equal to a linear SVM.

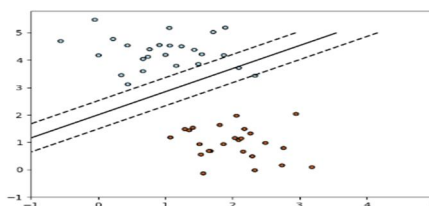


Fig.1: Decision Boundary of SGD Classifier

- c) *Regression*: The type SGDRegressor implements a simple stochastic gradient descent gaining knowledge of events which helps distinct loss features and penalties to in shape linear regression models. SGDRegressor is nicely suitable for regression troubles with a giant variety of coaching samples (> 10.000), for different troubles we advise Ridge, Lasso, or Elastic Net.
- 2) *IDE*: A built-in improvement surroundings (IDE) is a software program software that offers full software program improvement facets to laptop programmers. It was once employed in the provided undertaking and aided in the writing of code, deployment, and execution of the underlying model, as nicely as reaching the critical results.
- a) *Visual Studio Code*: Microsoft's Visual Studio Code is some built-in improvement surroundings for Windows, Linux, and Mac OS X. Debugging, syntax highlighting, sensible code completion, snippets, code refactoring, and embedded Git are amongst the features. Users can personalize the theme, keyboard shortcuts, and preferences, as nicely as deploy extensions that provide new features.
- 3) *Libraries Used*
  - a) *Pandas*: Pandas is a Python bundle for statistics manipulation and analysis. It is primarily based on the Matplotlib and NumPy libraries. As a result, it has a huge vary of aspects for each managing and visualizing data.
  - b) *NumPy*: NumPy is a Python programming language. NumPy is a library that consists of multidimensional array objects and a series of features for manipulating them. NumPy lets in you to behavior mathematical and logical operations on arrays.
  - c) *Keras*: Keras is a free open-source Python library for constructing and analyzing deep-learning models that is both powerful and simple to use. It covers Theano and TensorFlow, two efficient numerical computation frameworks, and allows you to create and train neural network models with just a few lines of code.
  - d) *TensorFlow*: This is a program that allows you to create tensor. TensorFlow is a machine learning software library that is free and open-source. It can be used for a variety of applications, but it focuses on deep neural network training and inference. TensorFlow supports both CPUs and GPUs, which is one of the biggest advantages for tensorflow. It also compiles faster than other deep learning libraries such as Keras and Torch.
- 4) *Framework Used*
  - a) *Django*: Django is a high-level Python internet framework that permits speedy improvement of tightly closed and maintainable websites. Built by means of skilled developers, Django takes care of plenty of the problem of net development, so you can focal point on writing your app barring desiring to reinvent the wheel. It is free and open source, has a thriving and energetic community, terrific documentation, and many selections for free and paid-for support.

### B. System Architecture

From the user's perspective, the internet site has a chat overlay the usage of which the consumer can chat with the bot. Any records the chatbot requires, the person immediately enters into the message window. The chatbots take this enter and suit it with the programmed responses. It then affords facts in its responses and in the structure of hyperlinks to the appropriate products.

### C. Process Flow

The discern proven beneath illustrates the usual working float of the system. To put quickly into words, it can be stated that consumer inputs his question in the chatbot and the question is processed at some stage in which chatbot appears at already existing records strings. If question enter and question database match, then chatbot offers the fabulous response from its database.

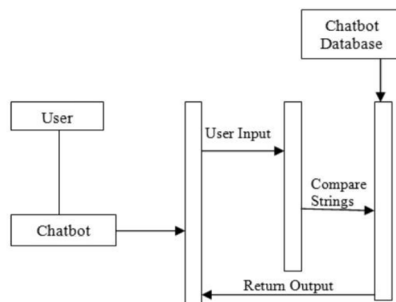


Fig.2: Process flow diagram

#### D. Data Set

For current purposes, the hand-built dataset in the form of “Intents” has been integrated in the system. Readymade datasets are easily available on websites like GitHub, Kaggle but for testing purposes of accuracy, that has not been used at this point. Although, it can be a future scope for the same.

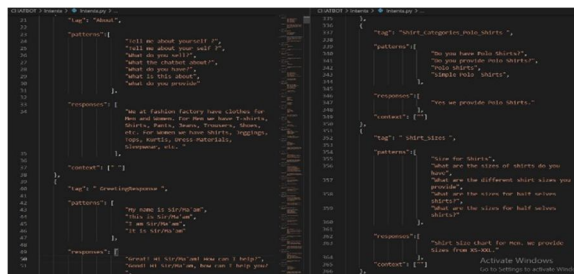


Fig.3: Intents

### IV. EXPERIMENTAL ANALYSIS

#### A. Model Implementation

The two foremost aspects are the internet site and the chatbot. They are built-in seamlessly to supply a suitable person experience.

- **Website:** The internet site is coded in HTML/CSS with PHP used for scripting. The internet site has a MySQL database that shops the product small print and inventory. The internet site will be built-in with Chatbot the usage of Django Framework.
- **Chatbot:** The Chatbot implementation will be achieved with the aid of enforcing a Sequential Model. The Sequential Model is defined below. Our task does now not comprise any dataset. The dataset will be the Intents that we have created. Intents are quick messages which will comprise a “tag, pattern, and response”. The chatterbot makes use of the Sequential model, to fetch responses based totally on person input. Sequential Model is written in python and is an easy scripting language for giving Genius to chatbots and different conversational entities. It’s a simple text, line-based scripting language to is easy to learn, speedy to type, and convenient to examine and maintain. We are the use of NumPy, Pandas, Keras, and TensorFlow libraries. The algorithm which we will be the use of is the SGD (Stochastic Gradient Descent) algorithm.

#### 1) Working Of Chatbot

##### a) Step 1 – Intents

Intents can be termed as brief messages.

```
{
tag: 'T1'
pattern: [ 'p1', 'p2,..... ]
response: ['A', 'B','C',.....]
},
```

Example:

```
tag = 'greeting'
pattern: ['Hi', 'How are you']
response: ['hello, how may I help you']
```

```
{
tag: 'T2'
pattern: [ 'p3', 'p4', ..... ]
response: ['X', 'Y','Z', .....]
}, and so on.
```

Tag	Pattern
T1	P1
T1	P2
T2	P3
T2	P4

Tag	Pattern
greetings	Hi
greetings	Hello
greetings	Have a nice day
greetings	How are you etc.

b) Step 2 – Separating the words from the pattern

Example:

Pattern is – “greetings, how may I help you”

Now the words, punctuation, special characters will be separated. It will be stored in a Word Dictionary. Everything will be given an index. Here any duplicate entry will be removed and the prefix & suffix will be neglected.

Index	Word
0	W1
1	W2
2	W3
3	W4
4	W5

Index	Word
0	,
1	?
2	I
3	how
10	may
25	greet
38	help
46	you

Fig.4: Word Dictionary

c) Step 3 – Encoding

All the possible pattern values will be separated and added to the dictionary. Now let’s say the size of the dictionary is 38, so accordingly, to the indexes values every time the particular word is present 1 will be assigned, or else 0 will be assigned.

Assuming the size of Dictionary = 46

For Encoding, an array with (size of Dictionary + 1) is formed.

[ \_ , \_ , \_ , ..... \_ , \_ , \_ , \_ ]

Index → 0<sup>th</sup> 1<sup>st</sup> 2<sup>nd</sup>                      43<sup>rd</sup> 44<sup>th</sup> 45<sup>th</sup> 46<sup>th</sup>

So, according to the Table drawn in the previous section, the value ‘1’ shall be assigned to words present at the index in array and ‘0’ shall be assigned to those not present in array.

[ 1 , 1 , 1 , 1 ..... 1 , ..... 1 , ..... 1 , ..... 1 ]

Index → 0<sup>th</sup> 1<sup>st</sup> 2<sup>nd</sup> 3<sup>rd</sup>                      10<sup>th</sup> 25<sup>th</sup> 38<sup>th</sup> 46<sup>th</sup>

Fig.5: Encoding

Now, this encoding is passed on to the Train part.

Train

[1 1 1 1 0 ... 0 1 1]

[1 1 0 1 . 0 .. 0 1 1]

[0 0 1 1 0 ... 0 0 1]

This Train will be the input to our Sequential Model.

B. Model Output

EPOCHS	LOSS	ACCURACY
90	0.6203	0.8173
100	0.4526	0.8635
130	0.4402	0.8804
170	0.6406	0.8239
200	0.8954	0.8763

Table.1. Epochs vs loss and accuracy

So we are getting the highest accuracy of 0.8804 at 130 epochs and the loss we are getting is 0.4402.

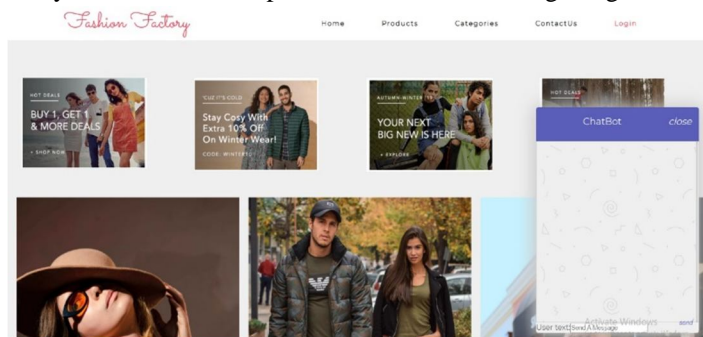


Fig.6: Website snippet

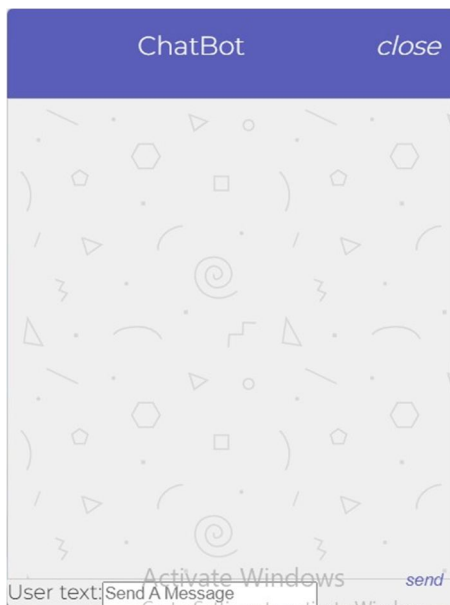


Fig.8: Chatbot Interface

The following graphs give insights on the loss and accuracy of the model. The model has achieved highest accuracy of 0.8804 at 130 epochs. At this accuracy, we will also be able to predict the accuracy of answers responded back to user by the chatbot.

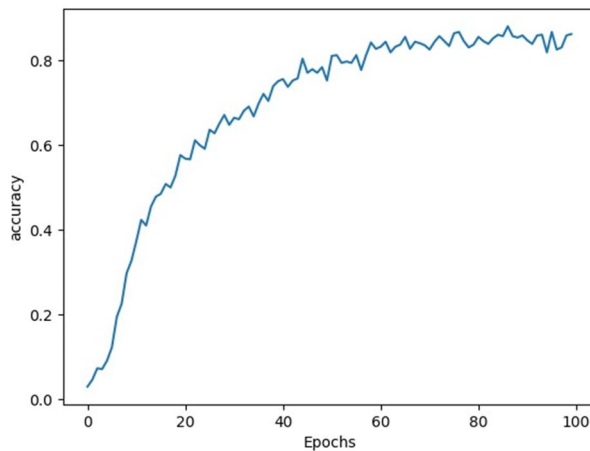


Fig.9: Epochs vs Accuracy graph

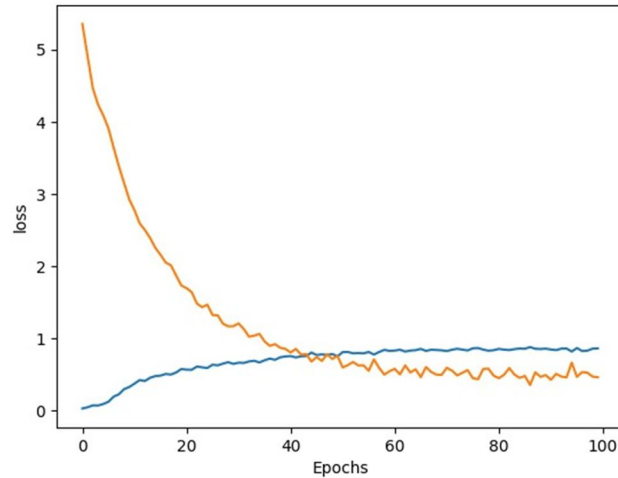


Fig.10: Epochs vs Loss graph

```

USER --> hi
Greeting
JARVIS --> Hi, Sir/Ma'am happy to see you here.
USER --> what is your name
Name
JARVIS --> Call me JARVIS
USER --> good afternoon
Greetings_GA
JARVIS --> Good Afternoon Sir/Ma'am, what can I do for you?
USER --> what types of t-shirts do you have
T-Shirt Types
JARVIS --> The different types of the T-Shirts which includes are - Full sleeves t-shirts, Half sleeves
t-shirts, Plain t-shirts, Polo t-shirts, round-neck t-shirts, V-neck T-shirts and many more.
USER --> shirt categories
Shirt Categories
JARVIS --> We provide different kinds of Shirts like - Full Sleeves Shirts, Half Sleeves Shirts, Plain S
hirts, Printed Shirts and many more.
USER -->
    
```

Fig.11: Working of Chatbot on Terminal

```

CHATBOT > main_test.py /...
5
6
7 mp = ModelPredictor('./data/classes_s.csv', './data/transformedwordDict_s.csv', model_path='./model')
8 while True:
9     ip = str(input("USER --> "))
10    pre = mp.getPredictionFor(ip)
11    # printing tags
12    print(pre)
13    print("JARVIS --> ", mp.getResponseForClass(pre, new_intents))
14
15 # def loadModel(ip):
16 #     mp = ModelPredictor('./data/classes_s.csv', './data/transformedwordDict_s.csv', model_path='./model')
17 #     # while True:
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999
1000
    
```

Fig.12: Accuracy vs Epochs on Terminal

### V. CONCLUSION

Tech-savvy shoppers of nowadays are continually on the lookout for the fantastic and most customized patron experiences. It can appear a not possible undertaking to fulfil the onslaught of ever-evolving demands. However, there is one answer primed to fulfil the contemporary customer, and that is a chatbot. With a chatbot, your company can effortlessly provide tremendous assist and hostilities decision any time of day, and for a giant volume of clients simultaneously. According to Microsoft, 90% of customers assume an on line portal for purchaser service. As a vast component of enterprise evolution, the want for AI-powered chatbots will solely proceed to rise. Now is the time to deploy a chatbot solution so that your company doesn't get left behind.





## REFERENCES

- [1] "Super-Agent: A Customer Service Chatbot for E-commerce Websites" - Lei Cui\*, Shaohan Huang\*, Furu Wei, Chuanqi Tan, Chaoqun Duan, and Ming Zhou Microsoft Research Asia {lecu, shaohan, fuwei, v-chutan, v-chadu, mingzhou} @microsoft.com
- [2] "An E-Commerce Website based Chatbot" - Siddharth Gupta, Deep Borkar, Chevelyn De Mello, Saurabh Patil Department of Computer Engineering Xavier institute of Engineering, Mumbai, India, Vol. 6(2)
- [3] "ML Based Virtual Personal Assistant" - V. Lalitha, A. Dinesh, L. Parameswaran, S. Dinesh Kumar, Department of CSE, Sri Sairam Engineering College, Chennai, Vol 6, Issue 7, July 2019
- [4] "Chatbot using NLP to Provide Banking Information" - Abidah Elcholiqi, Aina Musdholifah, Master Program of Computer Science; FMIPA UGM, Yogyakarta, Indonesia Department of Computer Science and Electronics, FMIPA UGM, Yogyakarta, Indonesia Vol.14, No.1, January 2020
- [5] "Implementing a Chatbot for E-Commerce Site Using Artificial Intelligence Markup Language (AIML)" - Stefanus Ardhito Prasetya, Alva Erwin, Maulahikmah Galinium, Faculty of Engineering and Information Technology, Swiss German University, 2018.
- [6] Abbafati, L. 2017. "Disruptive Innovation in the Luxury E-commerce: The Case of Farfetch. Dissertation", Academic Year 2016---2017, Department of Business and Management, LUISS University
- [7] Allied Market Research 2017. "Online Clothing Rental Market by End-to-End-Users (Women, Men, and Kids) and Clothing Style (Ethnic, Western, and Others) --- Global Opportunity Analysis and Industry Forecast", 2017---2023. Mar 2017 <https://www.alliedmarketresearch.com/online-clothing-rental-market> consulted on 06/08/2019
- [8] Anderson, C., 2006. "The Long Tail: Why the Future of Business is Selling More for Less".
- [9] BAGAAR, 2018. "Digital leading the way to more sustainable textile & fashion industries" (blo <https://www.bagaar.be/insights/digital-leading-the-way-to-a-more-sustainable-textile-fashion-industry> consulted on 09/08/2019
- [10] Barthes, R., 1967. "The Fashion System, trans. Ward M., Howard R. New York: Random House"



10.22214/IJRASET



45.98



IMPACT FACTOR:  
7.129



IMPACT FACTOR:  
7.429



# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24\*7 Support on Whatsapp)