A New Chatbot for Customer Service on Social Media

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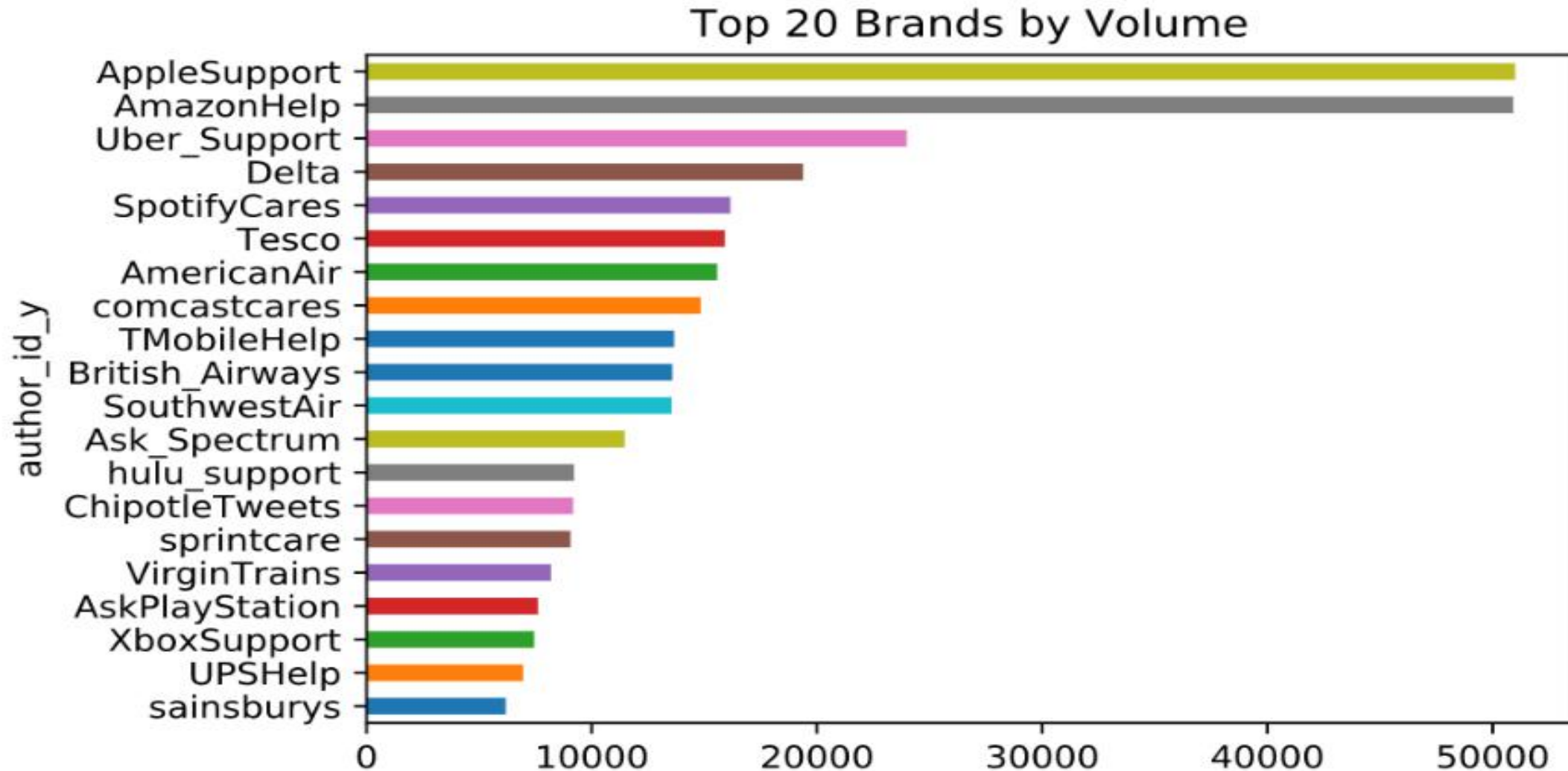IBM Research - Almaden
San Jose, CA, USA

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ABSTRACT-

1. Users are rapidly turning to social media to request and receive customer service; however, a majority of these requests were not addressed timely or even not addressed at all.

2. To overcome the problem, **this paper creates a new conversational system** to automatically generate responses for users requests on social media. Their system is integrated with **state-of-the-art deep learning techniques** and is trained by nearly 1M Twitter conversations between users and agents from over 60 brands.

Dataset- Customer Support on Twitter (Kaggle)

(20 Products)

Top 20 Brands by Volume

Sample Example Support

AppleSupport

Hi, how can I help you?

Hi! Last ios update made my iphone unstable.

We'd like to help. What's happening with your iphone?

Well, it randomly crashes and battery is draining fast.

We'd like to look into this further. Please dm us to continue working on this. <url>

Ok, tnx, I'll dm you the details.

Dataset

	tweet_id	author_id	inbound	created_at	text	response_tweet_id	in_response_to_tweet_id
0	2	115712	True	Tue Oct 31 22:11:45 +0000 2017	@sprintcare and how do you propose we do that	NaN	1.0
1	3	115712	True	Tue Oct 31 22:08:27 +0000 2017	@sprintcare I have sent several private messag...	1	4.0
2	4	sprintcare	False	Tue Oct 31 21:54:49 +0000 2017	@115712 Please send us a Private Message so th...	3	5.0
3	5	115712	True	Tue Oct 31 21:49:35 +0000 2017	@sprintcare I did.	4	6.0
4	6	sprintcare	False	Tue Oct 31 21:46:24 +0000 2017	@115712 Can you please send us a private messa...	5,7	8.0
5	8	115712	True	Tue Oct 31 21:45:10 +0000 2017	@sprintcare is the worst customer service	9,6,10	NaN
6	11	sprintcare	False	Tue Oct 31 22:10:35 +0000 2017	@115713 This is saddening to hear. Please shoo...	NaN	12.0
7	12	115713	True	Tue Oct 31 22:04:47 +0000 2017	@sprintcare You gonna magically change your co...	11,13,14	15.0
8	15	sprintcare	False	Tue Oct 31 20:03:31 +0000 2017	@115713 We understand your concerns and we'd l...	12	16.0

Sequence-to-Sequence Learning
Input(left in reverse order)
Output(right)[1]

Chatbot Interfaces
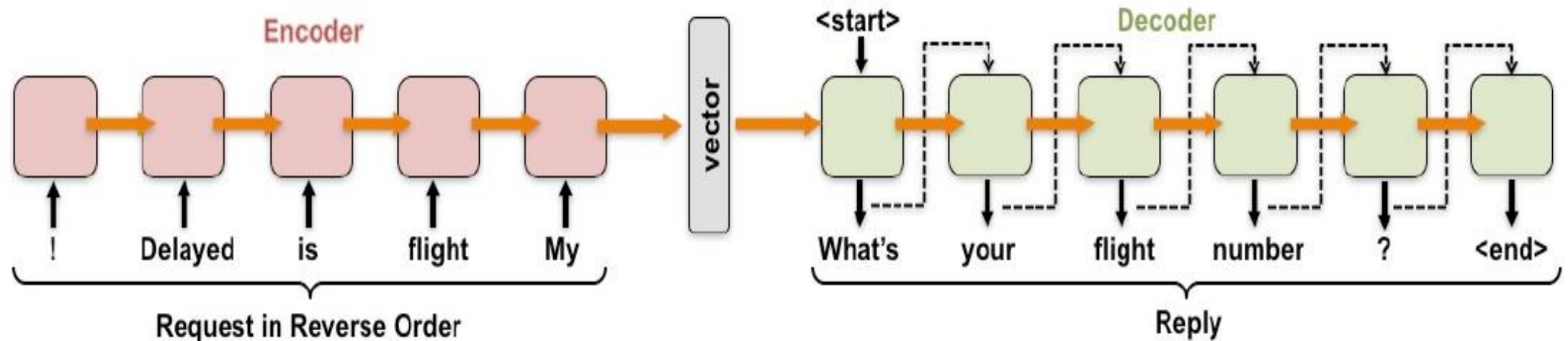
CHI 2017, May 6–11, 2017, Denver, CO, USA

Figure 1. Sequence-to-sequence learning with LSTM neural networks.

Chatbot output after Training Model to 4000 iterations for AppleSupport

```
> Hi
Bot: we d like to help . let s take this to dm and we ll explore ways to provide you assistance . the link below . your phone
> Hello, internet. Can someone explain why this symbol keeps appearing on my phone and when I try to type the letter I? Also
Bot: we d like to look into this with you . dm us which ios version you re on and we ll go from there . out for us .
> Thank you I updated my phone and now it is even slower and barely works. Thank you for ruining my phone.
Bot: we d like to help . please dm us details of the issues you re experiencing and we ll work with you towards a resolution . your phone .
> Why does my I not work ?! please fix this!!!
Bot: we d like to help . dm us and tell us which device you re using and what s happening . it here
> iOS 11 is killing my battery . Fix it.
Bot: we d like to help . dm us which device you re using and we ll work with you there . your battery here
> it has, but not for some time now. i've tried with two different apple ids but it's still not showing up on my phone
Bot: we d like to look into this with you . dm us using the link below and we ll go from there . out for us . !
> my PHONE app doesn't work. Thank you for updating my to an
Bot: we d be happy to look into this with you . please reach out to us via dm and we ll get started . there . !
> It's been a few days since made me update my phone's operating system. Now constantly glitching, hmm I'm shocked!
Bot: we d like to look into this with you . please dm us and we ll continue there . out for us . your phone . them
> started before downloading 11.1 (was never able to download 11.0.3). hasn't gotten better since update
Bot: we d like to help . let s take this to dm and we ll explore ways to provide you assistance . your phone . ! .
```

Continued Output

> . . haven't been able to type I since the new update

Bot: we d like to help . dm us and we ll get started . there . . . .

> So one has to go back to call log. Click that message icon again and then a chat for that particular number opens up.

Bot: we d like to look into this with you . please dm us and we ll get started . there . this link

> After iPhone update, my battery dies quicker than it charges when using my sleep/alarm app. On 1% when my alarm woke me

Bot: we d like to look into this with you . please dm us which ios version you re on and we ll work together from there . .

> when are y'all gonna fix this "i" thing ?

Bot: here s what you can do to work around the issue until it s fixed in a future software update update helpful helpful helpful resource handy

> I'm using 10.13.1. It crashed a few times before I updated last night and today as well. The laptop just shuts off completely.

Bot: got it . let s continue in dm . out to us here about the steps in this article to restart your iphone
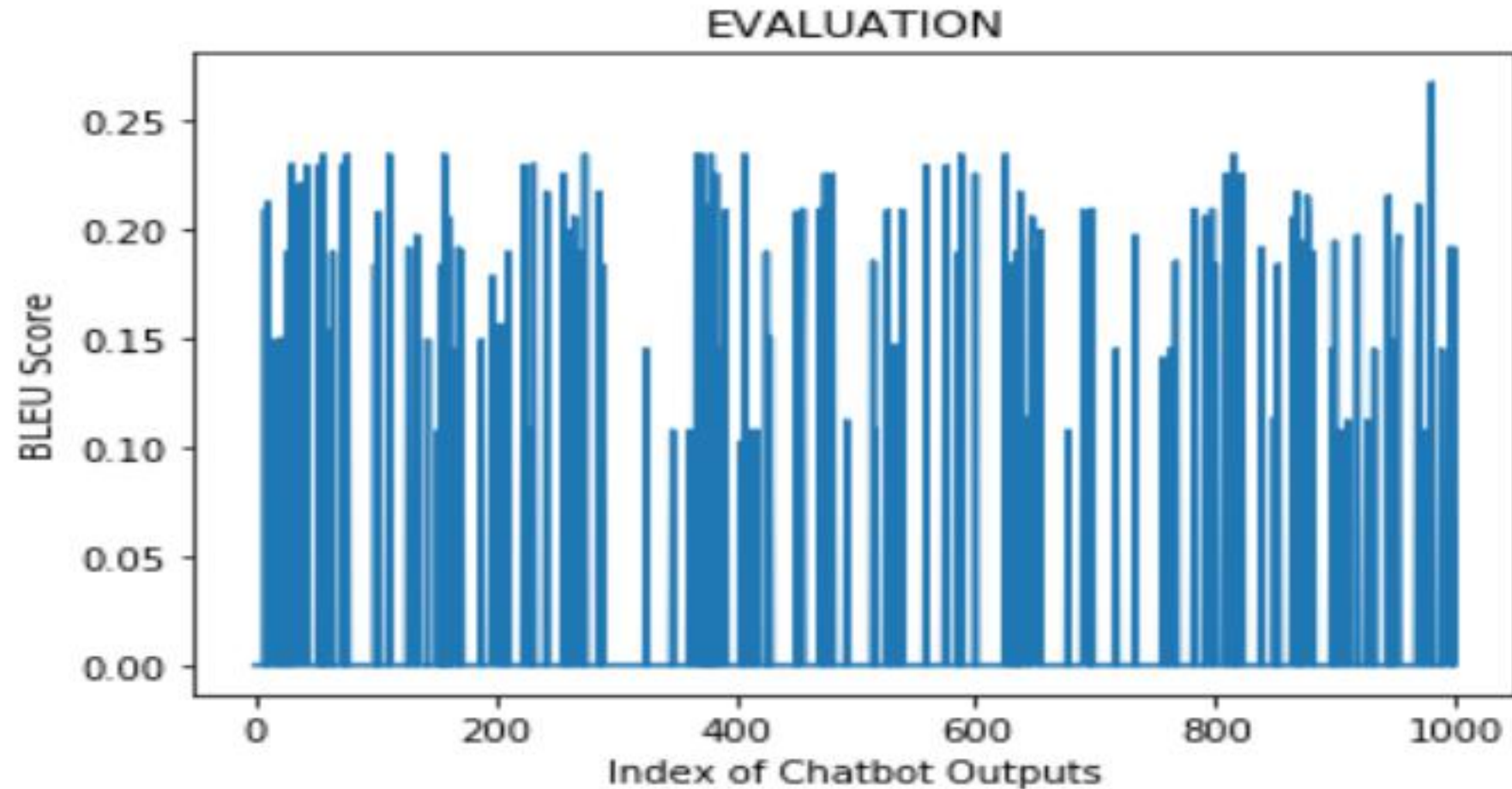
> your keyboard tripping my G

Bot: we d like to help . dm us and we ll get started . on the link below . your device updated . . .

> Please fix this issue, it's soooo annoying !!

Bot: here s what you can do to work around the issue until it s fixed in a future software update helpful helpful helpful helpful resource resource

EVALUATION USING BLEU SCORE

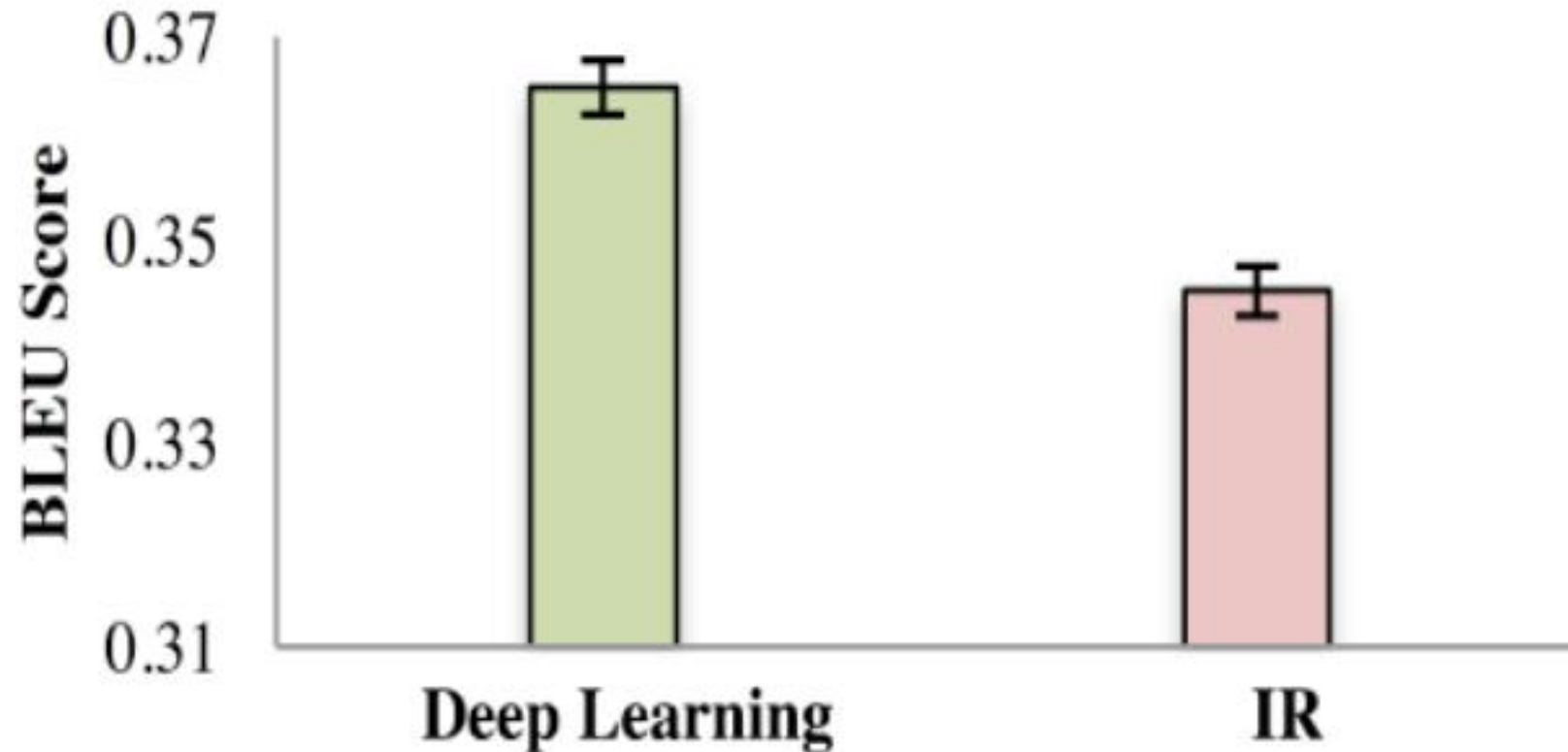The average BLEU Score is 0.0258454954594778

BLEU score by paper[1]:

Figure 3. BLEU scores of deep learning and IR systems.

Timeline for Next Stage

Week1
- 2 April
- Running code for 90000 epochs and Changing LSTM layers from 2 to 4

Week2
- 9 April
- Doing ANOVA score calculation using google form given to class

Week3
- 16 April
- Any Improvements

References

1. Anbang Xu, Zhe Liu, Yufan Guo, Vibha Sinha, Rama Akkiraju. 2017. A New Chatbot for Customer Service on Social Media. In Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems, 3506-3510.

2. https://pytorch.org/tutorials/beginner/chatbot_tutorial.html
3. https://www.youtube.com/watch?v=CNuI8OWsppg

THANKS