**LITERATURE SURVEY**

**1. Sentiment Analysis and Social Behaviour Prediction in Chatbots**

Authors: Bing Liu, Lei Zhang

Publisher: Annual Review of Computer Science

Year: 2012

The report discusses several techniques of sentiment analysis, which have been key in the interpretation of, and responding to the emotions of users by chatbots. The study outlines machine learning approaches, including supervised learning algorithms, for example, Naive Bayes and Support Vector Machines, very common in the classification of sentiments. It also touches upon the issues of contextual nuances and mixed sentiment in the dialogue data. It emphasizes the extra value of sentiment analysis for chatbot responsiveness especially where emotional intelligence comes into play in particular applications.

**2. Deep Learning-Based Chatbot Systems for Emotional Support**

Authors: Oriol Vinyals, Quoc V. Le

Publisher: Google Brain

Year: 2015

The proposed work in this research introduces a sequence-to-sequence model that utilizes the powers of Recurrent Neural Networks and Long Short-Term Memory units in enabling chatbots to parse contextual queries. Their work stands as one of the most critical points in chatbot development since it enables the system to learn responses that are relevant as well as empathetic. Although quite talkative, the base methodology of this model gives a simple framework to even more complex systems, such as emotional chatbots that can sense the embedded sentiment in a user's message and respond relevantly by changing their response in terms of contextual signals.

**3. Finding Social Media Engagement with Chatbots**

Authors: Justine Zhang, Cristian Danescu-Niculescu-Mizil

Publisher: Association for Computational Linguistics (ACL)

Year: 2018

This research is dedicated to studying user interaction behaviors in social media chatbots oriented towards studying conversational behavior that encourages continued interaction with users. The research analysis employs various metrics for engagement; the findings indicate that more extended user interactions occur by chatbots manifested with personality traits as well as emotional intelligence. Techniques such as NLP and conversational design principles are employed to analyze patterns and predict user behaviour. It brings to the fore the effects of emotionally aware chatbots in social media and online communities.

**4. Emojis as Features for Sentiment and Emotion Classification in Chatbot Dialogue**

Authors: Wei Ai, Yinghan Zhao, Jiebo Luo Publisher: International.

Conference on Human-Computer Interaction Year: 2017 It explains the use of emojis as an emotion and sentiment recognition entity in the chats of a chatbot. This article combines NLP with emoji-based sentiment analysis to give an insight into the emotional undertone being passed through the usage of emojis in the text messages. Emojis can indeed be trustworthy factors that indicate the sentiment of the user and, hence, their inclusion would greatly enhance interaction in chatbots. It has experimentally been proven that the inclusion of emojis in models of sentiment analysis enhances the accuracy rate of non-verbal emotional cues identification.

**5. Affective Computing and Emotional Intelligence in AI Chatbots**

Authors: Rosalind Picard

Publisher: MIT Press

Year: 2001

Affective computing by Rosalind Picard gives the theoretical foundation to create emotionally intelligent systems and, hence, chatbots. The research focuses on the methods of emotion recognition and processing in terms of facial expressions, voice tones, and textual cues. This research underlines the necessity of affective AI, highlighting that an empathetic virtual assistant capable of understanding emotions can significantly strengthen a chatbot's position in the market. It has served as fundamental work that has inspired a number of projects involving developments in emotional AI and chatbot endeavours.

**6. Mental Health Support Chatbots: A Scoping Review**

Author: Alison Darcy, Molly A. Vossen, Adam L. Kroll

Publisher: Frontiers in Psychology

Year: 2020

This review is on the effectiveness of chatbots as sources of mental health support, primary targets of users afflicted with depression or anxiety. Darcy et al. provide the scoping review of AI Chatbots which use therapeutic intent, incorporating principles of CBT into chatbots. The results indicate that chatbots can be used to alleviate mild mental health disorders by giving conversational support. The paper then discusses the possibility of using AI-powered chatbots as low-cost, scalable solutions for addressing the provision of mental health services.

**7. Temporal Patterns and Daily Activity Analysis in Digital Interactions**

Authors: Eytan Bakshi, Solomon Messing, Lada A. Adamic

Publisher: Facebook Research

Year: 2015

This paper analyses usage patterns of social media users in terms of the daily and weekly cycles, investigating the periodic nature of digital engagement. By using large datasets, it identifies peak periods for activity and studies the factors which influence patterns of engagement. Techniques such as activity heatmaps and timeline analysis could be applied to realize trends in behaviour over time, and such methods can be applied directly onto chatbot analytics so that the chatbots will be able to adjust their responses according to changes over time in temporal engagement patterns.

**8. Word Clouds in Summarizing Communication Data**

Authors: Heidi S. Morton, Martin D. Riedl

Publishing company: ACM Conference on Information Visualization

Year: 2019

The study evaluates how word cloud visualizations can be used for summarizing conversational data, supporting easy identification of key themes in chat-based systems. The authors analyse how word clouds improve the interpretation of high-frequency terms in thematic analysis of conversations. This basic visualization technique is shown to be effective in summarizing the contents of large chat datasets in an effort to visualize common topics and user concerns in chatbot interactions.

**9. Psychological Impact of Emotionally Intelligent Chatbots**

Authors: Jonathan Gratch, Stacy Marsella

Publisher: Emotion Review

Year: 2013

This paper discusses the psychological impact that emotionally intelligent chatbots have on the users. The empathetic response from AI within the user influences user emotions and engagement. This study measures the effectiveness of an empathetic chatbot in creating a great user experience by using behavioural analysis and feedback from the users. The outcome of this study indicates that interactive, emotionally responsive chatbots may develop a sense of companionship in users' lives and reduce loneliness and increase user satisfaction. The research contributes value to designing more emotionally engaging chatbots.

**10. Application of Natural Language Processing for Chatbots**

Authors: Christopher D. Manning, Hinrich Schütze

Publisher: Cambridge University Press

Year: 1999

Manning and Schütze's book describes the seminal work on NLP algorithms, which is pivotal for chatbots in text-based input interpretation. Tokenization, lemmatization, and parsing are promoted as subsets of any processing chatbot that deals with texts. This underlies most of the premise of a number of applications derived from NLP applications in chatbots, and therefore, allows the chatbots to decipher complicated patterns of language and respond appropriately.

**11. Matrix Factorization Techniques for Recommender Systems**

Authors: Yehuda Koren, Robert Bell, Chris Volinsky

Publisher: IEEE Computer Society Press

Year: 2009

Although primarily applicable to the field of recommender systems, the techniques developed by Koren et al. can be applied more generally to NLP and chatbot contexts. The methodology discussed here and extended in the context of the Netflix Prize competition can improve the ability of systems that predict from sparse data. Similar methods have also applied collaborative filtering toward improvement in dialogue generation in chatbots, where the prediction of a user's responses is possible through techniques of this nature, enhancing personalization and relevance for the purpose of chatbot conversations.

**12. Emojis in Textual Communication: Integrated Insights**

Authors: Linda Kaye, Helen Malone

Publisher: Social Media & Society

Year: 2019

This paper explores how the emotive acts as a mediator for expression within digital communication, namely through the context of chatbots and virtual assistants. Placing emojis in sentiment bins allows for a structure to amplify the detection of emotion within text data. The results show that emojis do serve an important function when establishing emotional intent, hence the argument is there that chatbots may employ emoji-based sentiment analysis to better capture the user moods and propose more thoughtful conversation responses.

**13. Human-Chatbot Interaction Behavioural Analytics**

Sonia Jain, Michael Quinn

Journal of Behavioural Analytics Publishers

Year: 2021

This paper explores behavioural analytics as an improvement tool in human-chatbot interactions. The study will be able to point out and develop key behavioural patterns influencing user satisfaction through the engagement metrics of response time, length of message, and frequency. Findings suggest that when developers optimize the chatbots for greater responsiveness and user-centricity, tracking those behavioural cues could provide valuable insights into user engagement and satisfaction.

This literature review encapsulates key contributions relevant to developing chatbots for tracking emotional and social behaviour. It discusses techniques ranging from sentiment analysis and NLP towards developing visual analytics and behaviour prediction, underlining their importance in the design of chatbots empathetic and engaging in nature.

Consists of 7 pages, surveys read by Harshita Nagpal(E23CSEU1438), Navya Singh(E23CSEU1429).

Read these surveys about chatbot on google and took help of AI.