

# A Study On Equipping Chatbots With Emotions

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The task of making chatbots that make use of Natural Language Processing (NLP) Technology have emotions is daunting, but not impossible. However, the process of doing that starts with data. There must be enough labelled data to teach the chatbot empathy. A large dataset of phrases, depicting different kinds of emotions must be compiled. Gathering of data can be achieved with Artificial Intelligence like Amazon Mechanical Turk. Once a large enough dataset is gathered, the process can start from there. In this document, the case of an NLP enabled text chatbot is considered.

An emotionally aware chatbot must have the following properties:

1. Ability to detect emotion.
2. Ability to respond properly to emotion.
3. Ability to proactively ask relevant questions.
4. Ability to differentiate between different kinds of sentences.
5. Must possess a definite personality.
6. Must have some sort of short term and contextual memory.
7. Ability to have some sort of analytical knowledge or common sense.

Points 1 and 2 can be achieved by training a neural network on a dataset of conversations. A dataset of such kind must have the following information:

- I. Accepted text
- II. The emotion of the Accepted text
- III. Response text
- IV. The emotion of the Response text

The problem of guessing the emotion of text can be very easily mapped to the problem of sentiment analysis. A simple machine learning model can guess the response emotion. In a more ideal case, to satisfy points 3, 4, 5 and 6, there must be a series of accepted text and response text, their corresponding emotions and the corresponding sentence form (interrogative, exclamatory, declarative, etc.). Since it is a time-series data, an LSTM can be used in guessing the emotion, sentence form and the response emotion and response form.

The personality issue mentioned in point 5, can be solved by pegging the personality to a definite type. However, that might not be ideal in several cases. Women and Men often have different speech patterns. People of different ages can also have different speech patterns.

Thus, the chatbot can be either instructed to match the age of the user or go the opposite way by assuming the personality of a younger person when talking to an elderly person or vice-versa. A similar thing can be done with gender, personal tastes and political orientation. Having determined the age, gender and the overall personality of the chatbot, the chatbot can either guess the user's properties or ask the user to give it relevant details. If it wants to guess, a separate model can be trained on such data. Asking the user for details is much less intricate and is recommended. The vocabulary available to the chatbot must be modified and limited according to the personality the chatbot assumes.

The problems described in points 6 and 7 can be addressed if a Constrained Conditional Model is used in the making of the chatbot. A Constrained Computational Model gives a more coherent response to a sample sentence if the provided sentence and the knowledge derived from it is appropriate. If the model is trained on the dataset, such that it gives appropriate weightage to the emotions of the user and such that its available corpus is limited to the personality it assumes, the resulting chatbot should be able to satisfy almost all of the points described above. This will make it a chatbot capable of displaying at least some human-like resemblance.