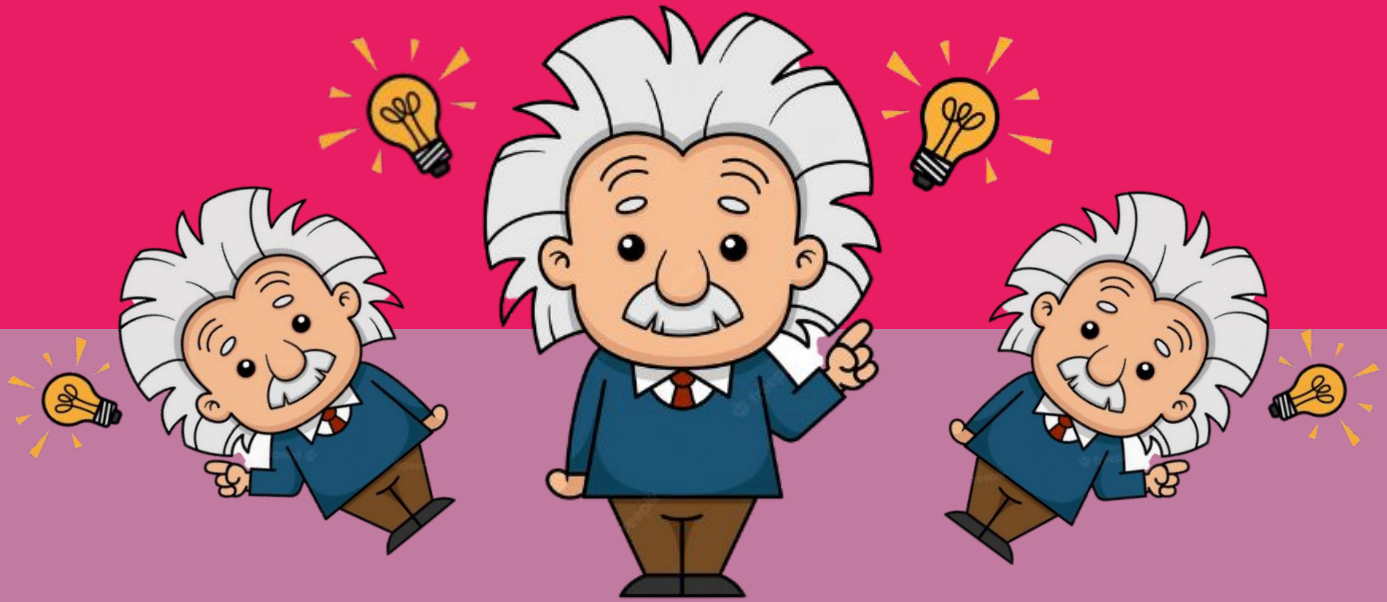
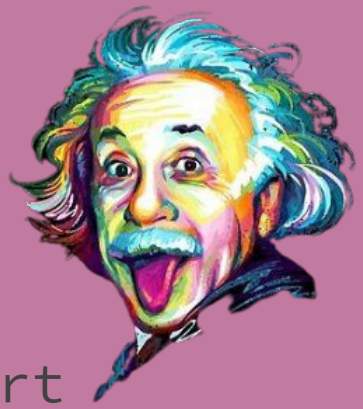
Albert Einstein

CHATBOT



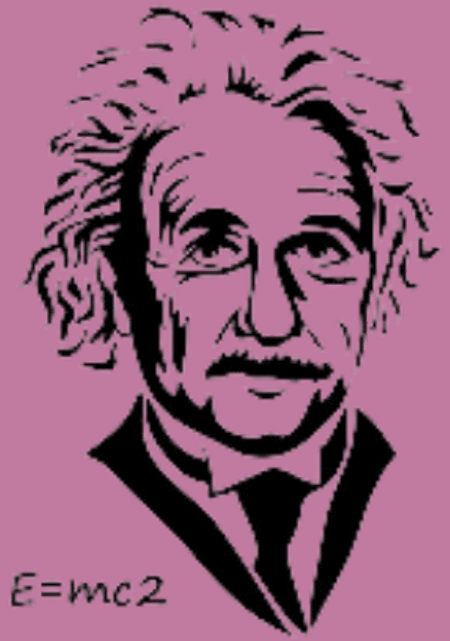
Kendra Givens, George Maddux, Kim Nguyen, Dennis Bandavong, Ankit Bhusal

Project Goals



- Build a generative chatbot based on Albert Einstein
- Train it on his letters and research papers
- Gain experience using the transformer

Chatbot Overview

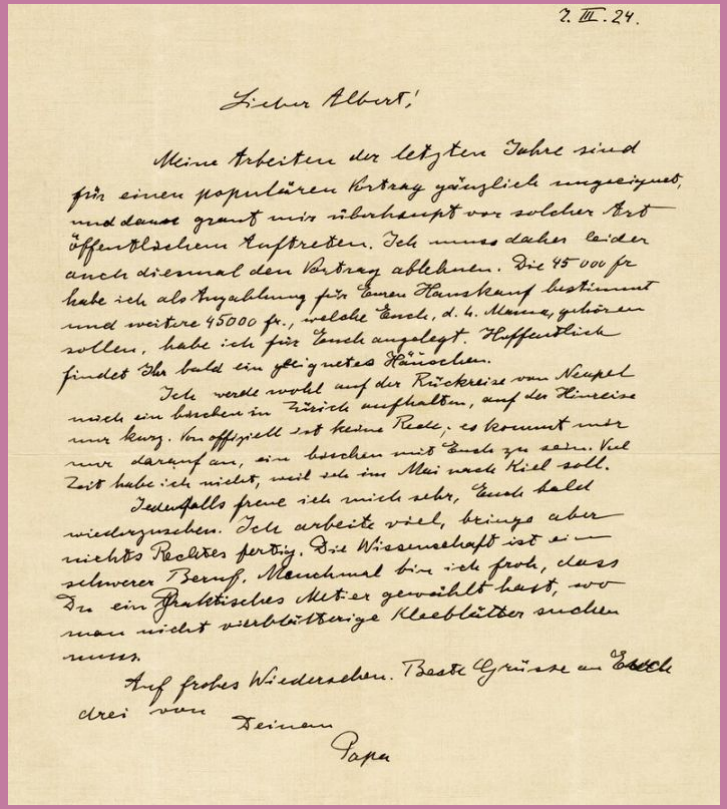


- Retrieval Based: picks response from set of predefined outputs
- Generative: creates a response based on input
- We decided to create a generative because it is more versatile

Data

- Gathered letters and research papers from Princeton’s Digital Einstein Papers website
- Formatted data to separate each letter into independent contexts
- Created input/output pairs to train the model

Data



2. III. 24.

Lieber Albert!

Meine Arbeiten der letzten Jahre sind für einen populären Vortrag gänzlich ungeeignet, und davon grault mir überhaupt vor solcher Art öffentlichem Auftreten. Ich muss daher leider auch diesmal den Vortrag ablehnen. Die 45 000 fr. habe ich als Auszahlung für Euren Hauskauf bestimmt und weitere 45000 fr., welche Euch, d. h. Mama, gehören sollen, habe ich für Euch angelegt. Hoffentlich findet Ihr bald ein geeignetes Häuschen.

Ich werde wohl auf der Rückreise von Neapel noch ein bischen in Zürich aufhalten, auf der Hinreise nur kurz. Im offiziell ist keine Rede, es kommt mir nur darauf an, ein bischen mit Euch zu sein. Viel Zeit habe ich nicht, weil ich im Mai nach Kiel soll.

Jedenfalls freue ich mich sehr, Euch bald wiederzusehen. Ich arbeite viel, bringe aber nichts Rechtes fertig. Die Wissenschaft ist ein schwerer Beruf. Manchmal bin ich froh, dass Du ein praktisches Metier gewählt hast, wo man nicht vierblättrige Kleeblätter suchen muss.

Auf frohes Wiedersehen. Beste Grüsse an Elsa drei von

Deinem

Papa

134. To Hans Albert Einstein

[Berlin,] 4 November [1915][1]

My dear Albert,

Yesterday I received your dear little letter and was delighted with it. I was already afraid you didn't want to write to me at all anymore. While I was in Zurich you told me that you find it unpleasant when I come to Zurich.[2] That is why I thought it better if we were together somewhere else where we can relax cozily with no one disturbing us.[3] In any case, I shall press for our being together every year for a month so that you see that you have a father who is attached to you and loves you. You can learn a lot of fine and good things from me as well that no one else can offer you so easily. What I have gained from so much strenuous labor should not be there only for strangers but especially for my own boys. In the last few days I completed one of the finest papers of my life,[4] when you are older I'll tell you about it.

I am very glad that you enjoy playing piano. This and carpentry are, I think, favorite pastimes at your age, even more so than school. These are things that fit a young person like you very well. On the piano, play mainly the things that you enjoy, even if your teacher doesn't assign them to you. You learn the most from things you enjoy doing so much that you don't even notice time passing. I am often so engrossed in my work that I forget to eat lunch. Also play ring toss with Tete. You gain dexterity from that. Go to my friend Zangger once in a while as well. He is a nice man.

Kisses to you and Tete from your

Papa.

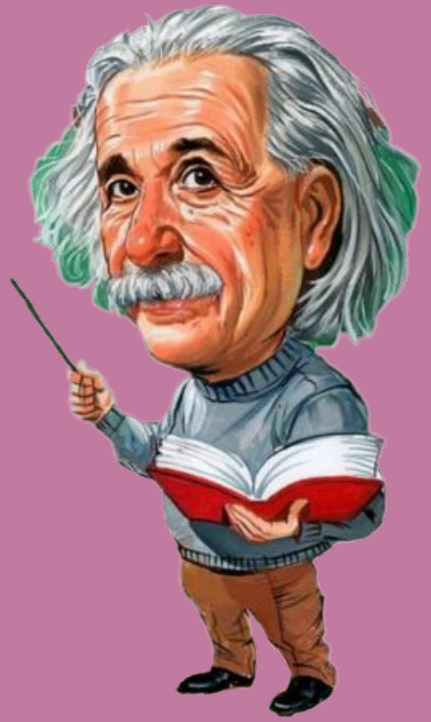
Regards to Mama.

Transformer

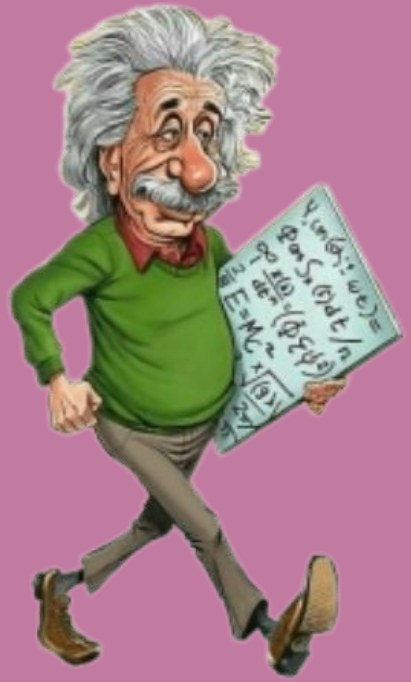
- Word embeddings convert the words to vector representations

- Positional encodings allows the model to take into account the order of the words

- Self-Attention captures how a word relates to every other word



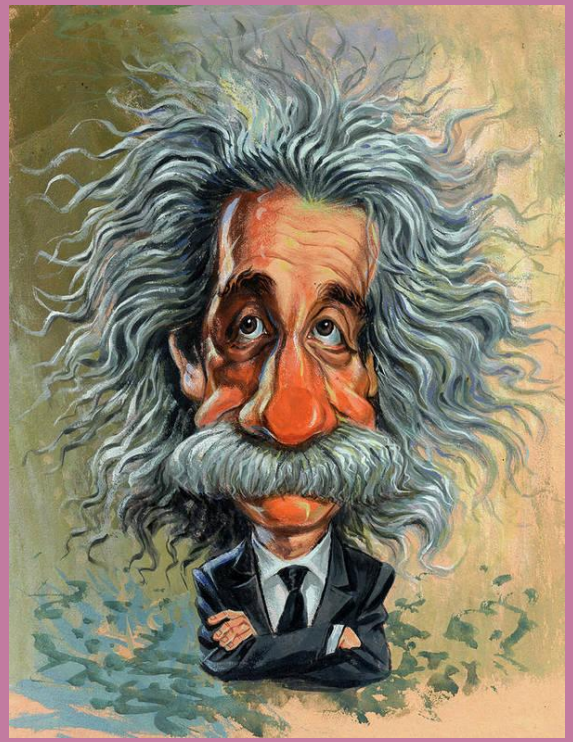
Transformer vs Other



- RNNs have a vanishing gradient problem
- Transformers process in parallel requiring less computation
- We wanted to try something complicated

Parameters

- Embedding dimension of 128
- 6 Multi attention heads
- Used 4 encoders and 4 decoders
- 6,559,171 parameters total



Contributions

- KENDRA - code, interface, milestones, presentation, demo
- KIM - data, code, proposal, presentation, demo
- DENNIS - data
- ANKIT - data, milestones, presentation, demo
- GEORGE - code, interface, presentation, demo

Honorable Mentions

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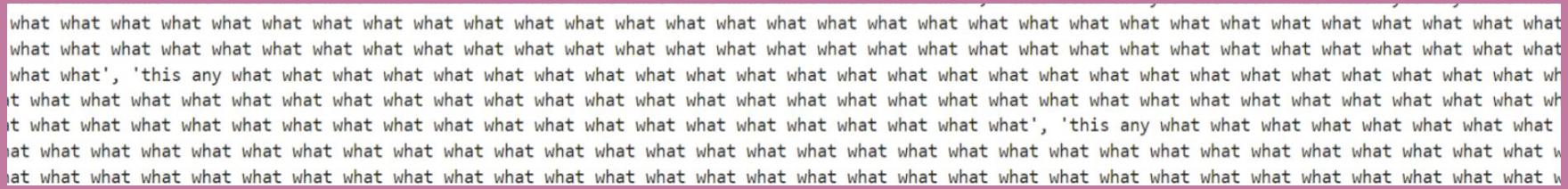
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