# Text Classification and Generation Using GPT



Name: Yuting Weng

#### Dataset

- Kaggle: Stress Detection from Social Media Articles
- Consists of both stress and non-stress related posts from Reddit.
- A Text Classification Task!

	Body_Title	label		
0	Envy to other is swallowing me Im from develop	1		
1	Nothin outta the ordinary. Paradise. Job stres	1		
2	Almost 49 and the chasm of emptiness has never	1		
3	I'm happy again After my closest friend left m	0		
4	Is it possible to recover from such a traumati	1		
3118	Positive relief ideas with stress? Hi all, my	1		
3119	Breakdown I really think I lost my mind last n	1		
3120	I feel as if I actually died a long time ago a	1		
3121	Is it wierd that i have imaginary friends at t	1		
3122	Head and Eye Pressure Since October (for the I	1		
3123 rows × 2 columns				

#### GPT (Generative Pre-trained Transformer)

• GPT can accept user-provided inputs (prompts) in order to generate responses in the form of document text, answers to questions, conversational text, etc.

## Zero-Shot Prompting

- In zero-shot prompting, the GPT model is provided with a prompt and asked to perform the task without any specific examples or training on the task.
- The model utilizes its existing knowledge and understanding of language to generate responses or make predictions.

## Zero-Shot Prompting

- A subset of 200 samples
- LangChain: frameworks that provide templates and utilities for constructing prompts and handling interactions between human annotators and machine learning models.
- Accuracy: 0.875; F1 Score: 0.217

	Body_Title	label	predict
1790	Low I'm so low rn I can't even type anything c	Stress	Stress
2639	I'm literally not good at anything. I suck soc	Stress	Stress
1797	Now boyfriend, inally over my ex who i o seeme	Non-stress	Stress
1989	I have a plan. I have no money. I stay up for	Stress	Stress
130	Long, but need advice on money stress My husba	Stress	Stress
3122	Head and Eye Pressure Since October (for the I	Stress	Stress
1832	Help with managing stress Hi All, I'm hoping f	Stress	Stress
2382	Work is giving me stress I get criticised ever	Stress	Stress
737	For those of you doing okay in school, how do $\dots$	Stress	Stress
835	y'all ever just give up mid-day and zone the f	Stress	Stress

```
from sklearn.metrics import accuracy_score, precision_recall_fscore_support
accuracy = accuracy_score(df_sampled["label"], df_sampled["predict"])
precision, recall, f1, _ = precision_recall_fscore_support(df_sampled["label"], df_sampled["predict"], average="macro")

print(f"Accuracy: {accuracy}")
print(f"F1 score: {round(f1, 3)}")

Accuracy: 0.875
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Stressful Examples:
I lost my job, and I don't know how I'm going to pay my bills.
I'm facing a difficult decision, and I'm afraid of making the wrong choice.
I'm constantly worried about the future and whether I'll be able to succeed.

Non-stressful Examples:
I'm taking things one step at a time and focusing on the present moment.
I am ready to tackle whatever the day brings.
I took a long nap in the afternoon and woke up feeling refreshed.
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#### Fine-tune GPT2 Model

- Fine-tuning involves taking a pre-trained model (GPT2) and further training it on a specific task or dataset.
- This process involves providing task-specific examples and updating the model's parameters to better fit the task at hand.
- Fine-tuning allows for more precise customization of the model

## Fine-tune LLM Model using GPT2

- Data Preprocessing: The dataset is preprocessed by sampling 100 random samples and splitting the data into training and validation sets.
- Tokenization
- Model Initialization: GPT2ForSequenceClassification
- Model Fine-Tuning
- Evaluation: Accuracy: 0.85; F2 Score: 0.91

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F1 Score: 0.9189189189189

Average validation loss: 0.5386338291456922

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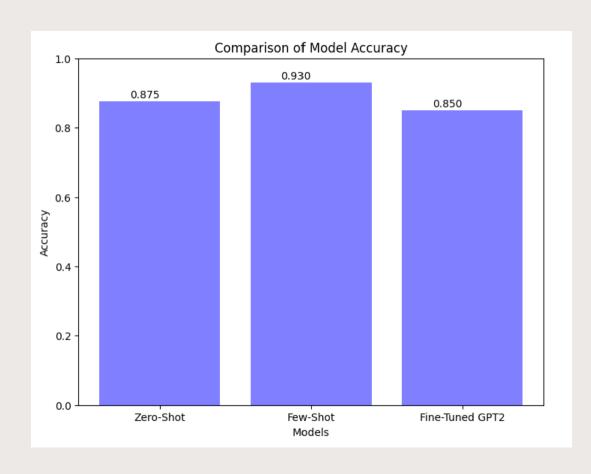
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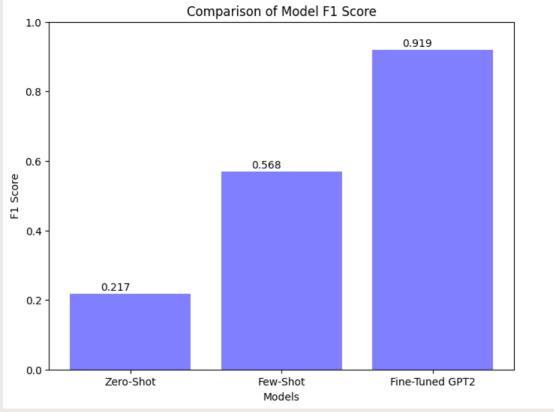
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## Performance Comparison





#### Generating Data

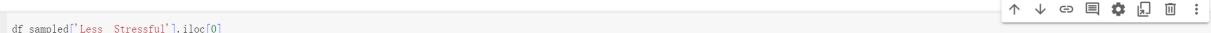
• Use posts from the dataset, and instructed the model to generate texts that are more stressful or less stressful.



'Is there a light at the end of the tunnel? I've been battling with chronic stress for about 3 weeks now. I want to say the cause of it is my job. It's the only thing that makes sense. Due to the pandemic, I've had 4 different positions within the past 3 months. My regular position that I held before this all this happened was awesome. I actually loved my job and looked forward to work each morning. When everything shut down back in March, until about the middle of May, I was moved to two other positions that we still pretty relaxed, the hours just kind of sucked. But now this new role that I've been in for about a month is killing me. It's very stressful, the days are long, it seems like a constant race against the clock, the people I deal with can be a p ain which adds more stress. I keep telling myself it's only temporary and hopefully I'll be able to get my old job as things start to normalize more. But for the past 3 weeks my symptoms have included Weighted chest (most prominent symptom) Lightheadedness/Dizziness Tightness in neck and shoulders Lower back pain Anxiety that won't go away Rapid heartbeat Acid reflux/heartburn Sto mach issues Fatigue I have tired to change my diet to start eating a bit healthier. I've also been trying breathing exercises and doing stretching in the evenings when I get home from work. I t seems to help a little. I also plan on getting back to the gym, because I know exercise will help out as well. I'm just wondering if this is something that will eventually go away or am I in it for the long haul? I've felt this way once before, about a month before my daughter was born. But it completely went away right after she was born. Not kidding. Maybe big life changes are my trigger? But I didn't feel this way when I got married or bought a house or anything like that. Any insight or advice to manage this is greatly appreciated!!<



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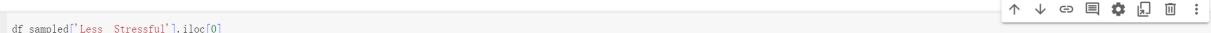
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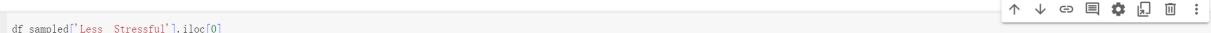
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# Sentiment Analysis and Word Cloud

```
# Perform sentiment analysis on a given text
    result = sentiment_classifier(df_sampled['Body_Title'].iloc[0])
    print(result)

No model was supplied, defaulted to distilbert/distilbert-base-uncased-fine
    Using a pipeline without specifying a model name and revision in production
    [{'label': 'NEGATIVE', 'score': 0.7747209072113037}]

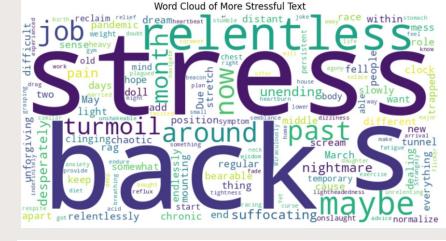
# Remove punctuation and special characters using regex
    text = re.sub(pattern, "", df_sampled['More Stressful'].iloc[0])

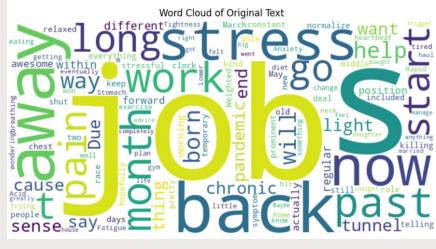
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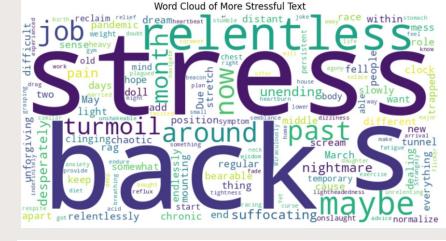
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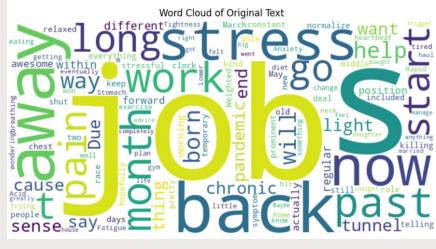
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## Actor-Critic Design

- The actor generates responses or outputs based on user prompts, while the critic evaluates the generated outputs and provides feedback to improve them.
- prompt = "Give the person who wrote the following text some suggestions."
- critique\_prompt = "Critique this text regarding its clarity and whether it offers practical advice and emotional support. Then rewrite the text incorporating these critiques to enhance its overall quality:"

#### 'Initial text:', generated text[0]

('Initial text:',

"1. Seek professional help: Consider speaking with a therapist or counselor to work through your feelings of chronic stress and anxiety. Therapy can provide helpful coping mechanisms and strategies to manage your symptoms.\n\n2. Communicate with your employer: Have an open and honest conversation with your employer about how you are feeling. They may be able to provide support or accommodations to help alleviate some of your stress.\n\n3. Prioritize self-care: Make time for activities that help you relax and unwind, such as mindfulness meditation, yoga, or spending time in nature. Taking care of your physical and mental health is crucial during stressful times.\n\n4. Explore new job opportunities: If your current role is causing you extreme stress and discomfort, explore the possibility of finding a new job that better aligns with your skills and values. It's important to prioritize your well-being and happiness in your career.\n\n5. Lean on your support system: Reach out to friends and family members for emotional support and encouragement. Having a strong support system can make a difference in how you navigate through difficult times.\n\n6. Be patient with yourself: Remember that healing from chronic stress takes time, and it's okay to have setbacks along the way. Be kind to yourself and celebrate small victories as you work towards overcoming this challenging period.")

#### Result

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'Critique #1:', generated\_text[1]

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"This text is clear in its recommendations for managing chronic stress and anxiety, offering practical advice and emotional support. However, it could benefit from a more empathetic tone to better connect with the reader's emotions. \n\nRewritten version:\nDealing with chronic stress and anxiety can be overwhelming, but there are steps you can take to support your mental health and well-being during difficult times:\n\n1. Seek professional help: It's important to prioritize your mental health. Consider reaching out to a therapist or counselor who can provide coping mechanisms and strategies to manage your symptoms.\n\n2. Open up to your employer: Having an honest conversation with your employer about how you're feeling can lead to support and accommodations that can help reduce your stress levels.\n\n3. Take time for self-care: Make it a priority to engage in activities that help you relax and recharge. Whether it's practicing mindfulness meditation, doing yoga, or spending time in nature, taking care of your physical and mental health is crucial during stressful times.\n\n4. Explore new opportunities: If your current job is causing you extreme stress, consider exploring new job opportunities that better align with your skills and values. Prioritizing your well-being and happiness in your career is essential.\n\n5. Lean on your support system: Reach out to friends and family for emotional support and encouragement. Having a strong support system can make a significant difference in how you navigate through challenging times.\n\n6. Be patient and kind to yourself: Remember that healing from chronic stress takes time. It's okay to have setbacks along the way, so be patient with yourself and celebrate small victories as you work towards overcoming this challenging period.")