Name: Ronaldlee Ejalu

Course Name: CSC 583

Assignment number: HW#6

1. Task 1
   a. Two general models:
      ● Openai-gpt

```
Some weights of OpenAIGPTLMHeadModel were not initialized from the model checkpoint at openai-gpt and are newly initialized: ['position_ids']
You should probably TRAIN this model on a down-stream task to be able to use it for predictions and inference.
[{'generated_text': 'Hello, HuggingFace, it\'s good to meet you. " \n " it\'s good to meet you too. " huggingface'},
 {'generated_text': "Hello, HuggingFace, what's this all about?'\n'it's a small affair ; a few guests are bringing up the food"},
 {'generated_text': 'Hello, HuggingFace, " i said, trying to sound pleasant and friendly. \n " if you have a place, i can give you'}]
```

   I noticed that since the generation of text relies on randomness, we set a seed to get the same text.
      ● Facebook/opt-1.3b

```
[{'generated_text': "Hello, I'm respectful and honest, willing to help out and try and not be too bossy because I am an easy going person.\nCan"},
 {'generated_text': "Hello, I'm respectful and I'll never take advantage. The other two are toxic and I try and never talk to them again. If someone
is"},
 {'generated_text': "Hello, I'm respectful and interested in the trade. You're interested in something off my list? Please share your list so I can
have a look"}]
```

   It is interesting how these large language models generate text that is well formatted and to anyone without NLP knowledge will get scared of their jobs especially content writers, but I believe these tools are supposed to make our lives easier so long as that we use them in the right way.
   b. One domain specific model:
      ● Bigscience/bloomz-560m – it is model that explains instructions in a variety of languages.

```
[{'generated_text': 'Translate to Spanish: good morning to everyone. Buenos días a todos.'}]

[{'generated_text': 'Translate to English: comment allez-vous? How are you?'}]

[{'generated_text': 'Translate to Telugu:como vai? ఎలా పనిచేస్తుంది?'}]
```

   I ran three language translations and the LLM translates the instructions in several languages
   c. One pretained model on computer code
      ● Bigcode/santacoder

```
Setting `pad_token_id` to `eos_token_id`:50256 for open-end generation.
[{'generated_text': "def add_numbers(a, b):\n    return a + b\n\n\ndef test_single_argument():\n    a = parse_formula('"}]
```

   I used this model to generate a function that adds two numbers.
   The way you formulate your input text matters a lot, which would be a disadvantage
2. Task 2
   a. Gpt2-large
   Using the greedy search strategy produces a lot of repetitions of the same words.

```
0 : Bill Clinton's campaign manager, Patti Solis Doyle, said in a statement that the former president "has been a champion for women's rights and a
"He has been a champion for the rights of children and families, and he will continue to be a champion for the rights of women and children," Doyle
Clinton's campaign also released a statement from his daughter, Chelsea Clinton, who said she was "honored" to be a part of the event.
"I am honored to be a part of the Clinton Foundation's Women's Leadership Initiative, which is dedicated to empowering women and girls around the wor
The Clinton Foundation has been criticized for its lack of transparency, with critics saying it has not been transparent about its donors.
The foundation has said it has given away more than $2 billion to women's charities since its inception in 2001.
The Clinton Foundation has also been criticized for its lack of transparency, with critics saying it has not been transparent about its donors.
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The Clinton Foundation has also been criticized for its lack of transparency, with critics saying it has not been transparent about its donors.
```

   Also using Beam search generates repetitions of the same text

```
0 : Bill Clinton and his wife, former Secretary of State Hillary Rodham Clinton, leave the Whi
WASHINGTON (AP) — The Latest on the 2016 presidential race (all times EDT):
9:30 p.m.
Hillary Clinton's campaign says it has raised more than $1 million for the Democratic National
The campaign says in a statement that it has raised more than $1 million for the Democratic Na
The campaign says it has raised more than $1 million for the Democratic National Committee.
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```

With Top-k sampling, it prevents the kind of repetitions we were seeing in greedy & beam searches though consistency is lacking, and this is shown below:

```
0 : Bill Clinton's email scandal is similar to the one Robert Reich wrote about for the magazine in 1996 t

At that point, and after the White House granted a date to a House Benghazi committee lawyer to make publi

And, as the nation mourns, in part because his opponent, Donald Trump, has turned that strategy around by

"Next stop: President Trump," Frankfurt writes. He writes, "I'll be listening."
1 : Bill Clinton, though, will take his case to any stop line.

On his last day as president on Nov. 8, Bill Clinton will appeal a ruling in his lawsuit against the unive

The case was the subject of an on-air humor skit staged by WKRF and WHAS 11. "The University of Arkansas i

As president, Bill Clinton vetoed a bill signed by Arkansas Governor Bill Clinton in 1993 to create the Ce

HECLA

33 Audacious University Invests in Sugar Marching in unusual manner, Jeremiah Donthea, CQ Independent Woma
```

With Top-p sampling, the generated text looks more consistent:

```
0 : Bill Clinton was seen as a figure of change for women in America and the Democratic Party, and in 1997
1 : Bill Clinton would have appointed Jack G. Kennedy to be his Secretary of State and had the right to app

You can't beat the simplicity of that.

You can also understand why he chose the left-wing socialist, G. William Domhoff, as his Secretary of State

As you may know, Domhoff was one of the first major proponents of the welfare state, arguing that the state

Domhoff is the same guy who has admitted he wants to abolish the minimum wage.

If he gets his way, the entire U.S. government will be in the hands of an unelected bureaucracy.

Dominghoff also pushed for an income tax and is a major advocate of gun control.

It was that, coupled with his socialist views, that got Domhoff the job of Secretary of State.

At least, that's the explanation as to why Bill Clinton nominated him.

But as you can see, Domhoff wasn't exactly a progressive.

What makes Domhoff even more disgusting is that he was the Chairman of the International Monetary Fund.

So you can imagine how this man felt when he was named Secretary of State.
```

b. Facebook/opt-1.3b

Using greed search doesn't produce any repetitions:

```
0 : Hello, I would like to show some empathy and understanding to you. I am a Christian and I am sorry that
Thank you. I appreciate your kind words.
```

Using beam search produces repetitions as shown below:

```
0 : Hello, I would like to show some empathy and support to you and your family
1 : Hello, I would like to show some empathy and support to you and your family
2 : Hello, I would like to show some empathy and support to you and your family
3 : Hello, I would like to show some empathy and support to you and your family
4 : Hello, I would like to show some empathy and support to you and your family
```

Using top-k sampling generates text without repetitions though it lacks some consistence.

```
0 : Hello, I would like to show some empathy and hope that he recovers soon. I agree that a provide
yes the value is important, but you also have to feel that the provider has their heart in it.  you
1 : Hello, I would like to show some empathy and compassion.  Please read about internalizing your
I will, thanks for the offer! I just rely on positive reinforcement and self compassion.
```

Using top-p sampling generates consistent text as this is shown below:

```
0 : Hello, I would like to show some empathy and help out. I'm a new player, and am curious as to how people
I have a preference for what games I play. I have a basic rule set and that is how I make my games.
1 : Hello, I would like to show some empathy and compassion towards someone I do not know, and the reason I'm

This post is meant to start a conversation about how we treat people in the real world. I am aware that I hav

I am writing this because I want to help people see that the way they respond to others in life does have a h
```

This looks like some text written by a professional writer.

3. Task 3

I. With gpt2-large, using a size of stride of 512 takes 16 minutes to execute to produce a perplexity of 22.908 and using a size of stride of 1024 takes 8 minutes to execute, generating a perplexity of 26.106. Furthermore, reducing the size of the stride to 256 doubles the execution time producing a perplexity of 22.525. So, using a size of stride of 1024 gives a better perplexity of 26.11 with less execution time.

II. With gpt2-medium, using a size of stride of 512 takes 7 minutes and 40 seconds to execute producing a perplexity of 24.547 and using a size of stride of 1024 takes 3 minutes and 51 seconds to execute, generating a perplexity of 28.087. Furthermore, reducing the size of the stride to 256 doubles the execution time (15 mins and 23 seconds) generating a perplexity 24.126. So, using a size of stride of 1024 gives a better perplexity of 28.09 with less execution time. Comparing the two models, gpt2-large and gpt2-medium, gpt2-medium with a size of stride of 1024 generates a higher perplexity with less execution time.

General reflections:

This was a great assignment because it gave me an opportunity to work with Generative AI. After this class, I plan to spend some time reading some generative AI literature since this is mind blowing and the pace at which new models are coming up is surprising.

This was a good exercise.