

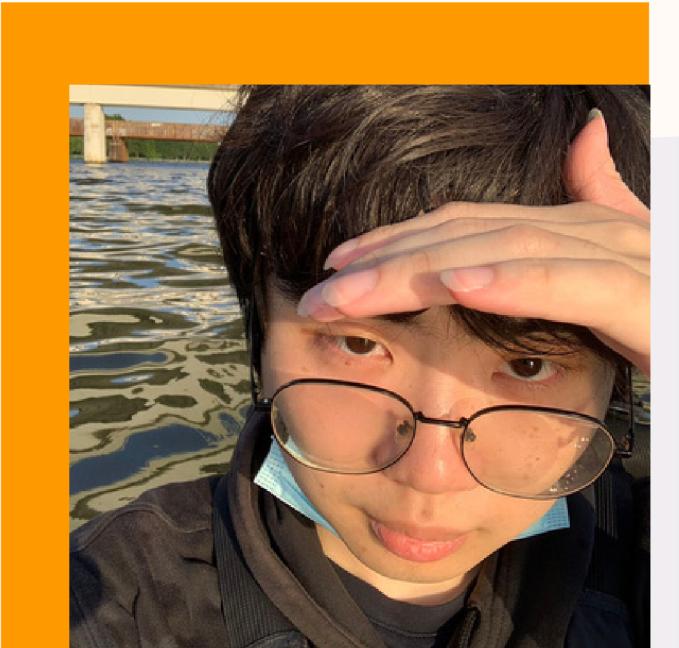


GEORGETOWN UNIVERSITY

# Automating Social Media Management

Utilizing NLP and CV to Enhance Georgetown University's Online Presence





**Minglei Cai**

Data Science 23'



**Jamie Zhang**

CCT 24'



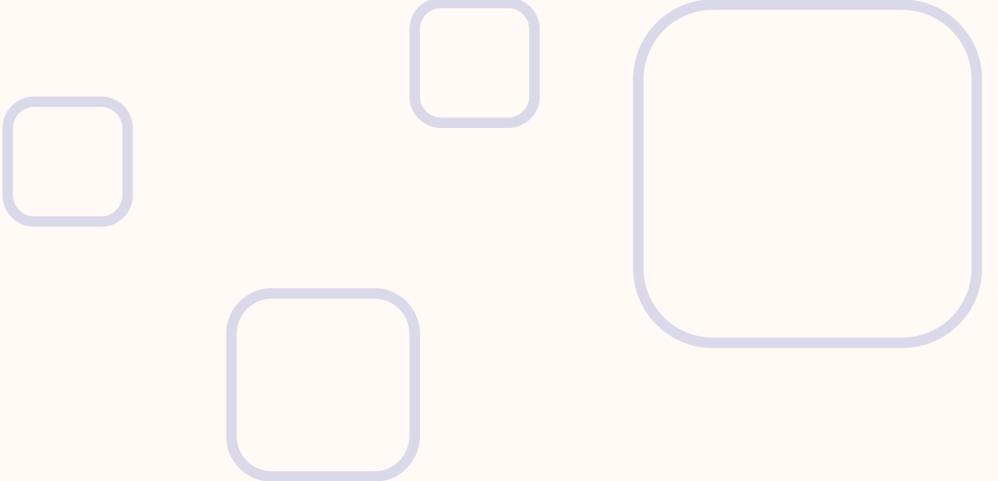
**Mike Liu**

Data Science 24'



**Shihong Zhou**

Data Science 24'



# TEAM MEMBERS

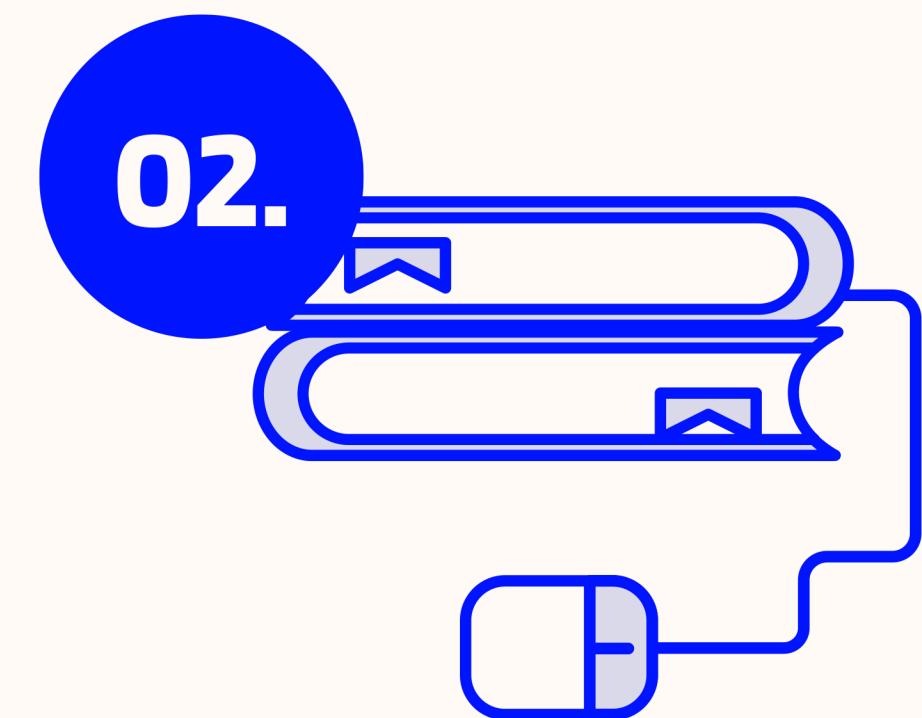


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The challenges that  
social media managers face



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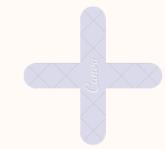
NLP+CV



## **EVALUATION**

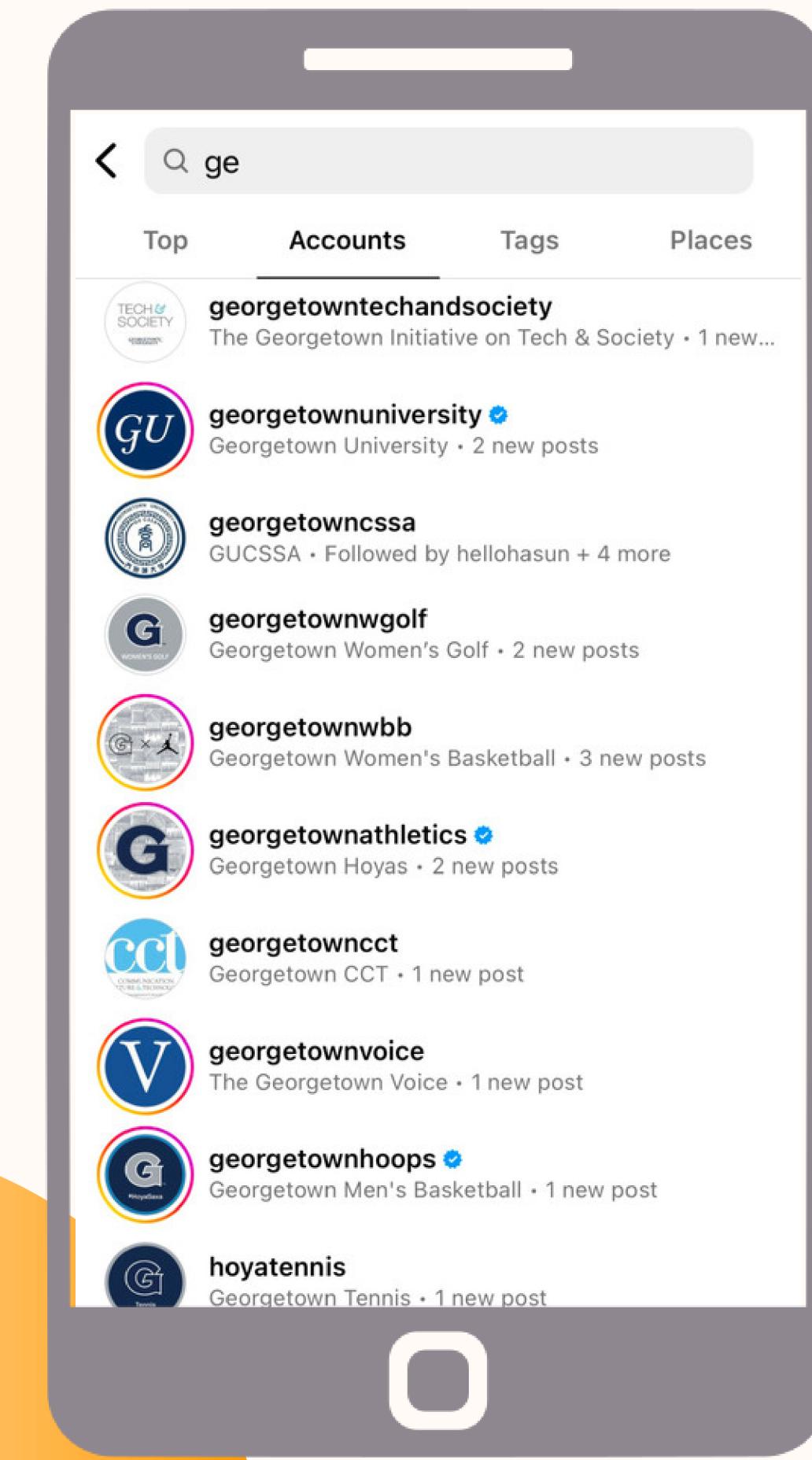
Evaluation from real experts

# DO YOU?



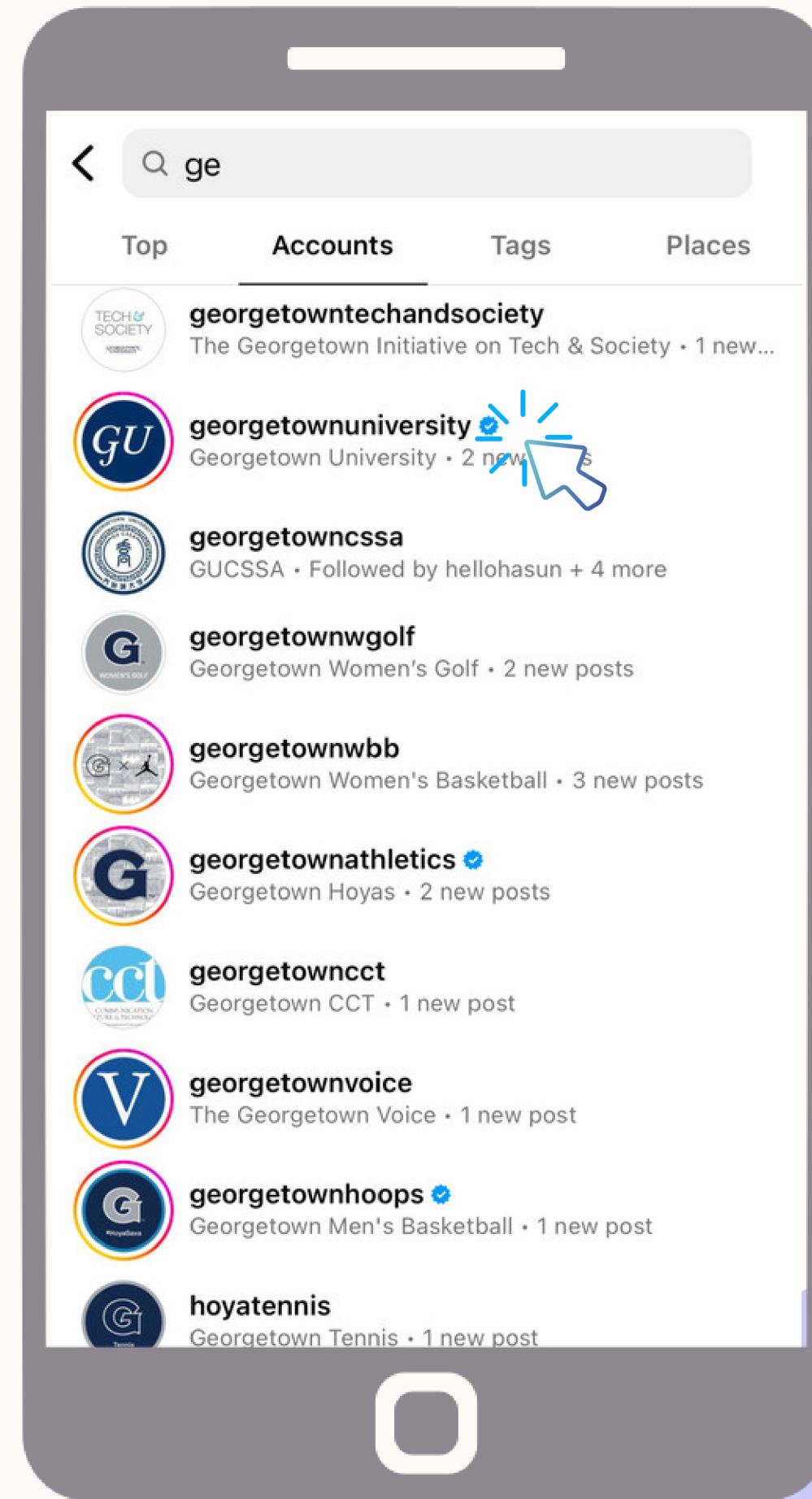
**PROBLEM**

# Geogetown **SOCIAL MEDIA**



PROBLEM

GU  
OFFICIAL



## PROBLEM

# FREQUENT TOPICS

## Holiday/Festivals

 georgetownuniversity 🎉 The Hilltop looks great in green. 🌟 Happy St. Patrick's Day, Georgetown!

Who else is counting down the days until spring?! 🌸

 georgetownuniversity 🎉 There's nothing like the holidays on the Hilltop. 🎄 As we reflect on our beautiful spot in Washington, DC, we are grateful for the staff who keep our campus shining and running smoothly. In the comments below, let us know who you are grateful for this holiday season. ↴

 georgetownuniversity 🎉 Happy winter break, Hoyas! ❤️ See you back on the Hilltop in 2023, and happy holidays from the Georgetown Storytellers 🎄

 georgetownuniversity 🎉 Happy last day of classes, Hoyas! ❤️

 georgetownuniversity 🎉 May this Easter fill your life with eternal love and light. Wishing our Georgetown community a Happy Easter.

 georgetownuniversity 🎉 Happy first night of Hanukkah to our Hoyas and to all who are celebrating around the world!

 georgetownuniversity 🎉 'Twas the night before Christmas, when all thro' the Hilltop, Not a Hoya was stirring, not even a bulldog. The lights were hung by John Carroll with care, in hopes that St. Nicholas would soon be there... Wishing our community in Georgetown and beyond a peaceful Christmas Eve.

 georgetownuniversity 🎉 Have yourselves a merry little Christmas, Hoyas! ❤️

## Season/Weather

 georgetownuniversity 🎉 Springtime at @georgetownlawofficial 🌸

 georgetownuniversity 🎉 Spring has finally made its way to the Hilltop! 🌸☀️

 georgetownuniversity 🎉 We can't PINK of any better photos of the Hilltop! 🌸

Tag us in your photos of springtime at Georgetown 🌸

 georgetownuniversity 🎉 We can't wait for spring days on the Hilltop! 🌸

#FlashbackFriday to April 1984. Leave a comment below if you were on campus then!

 georgetownuniversity 🎉 Leave a 🌸 below if you think the Hilltop is already ready for springtime!

 georgetownuniversity 🎉 Whether it's the fall or spring semester, it's always nice seeing our Hoyas on the Hilltop. Happy first day of classes, Hoyas!

 georgetownuniversity 🎉 Roll call! 🗣️ Hoyas, where are you spending Spring Break? 🌴

## PROBLEM



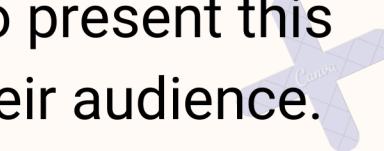
### Balancing Informative and Fun Content

Social media managers need to create content that strikes a balance between being informative and engaging, while also being entertaining and enjoyable for the audience.



### Creating Fresh Content Despite Similar Topics

Social media managers may frequently need to cover similar topics, such as holiday greetings. However, they must constantly come up with fresh and engaging ways to present this information to their audience.



### Creating High Volume of Daily Posts

Social media managers must create a high volume of posts every day across multiple platforms.

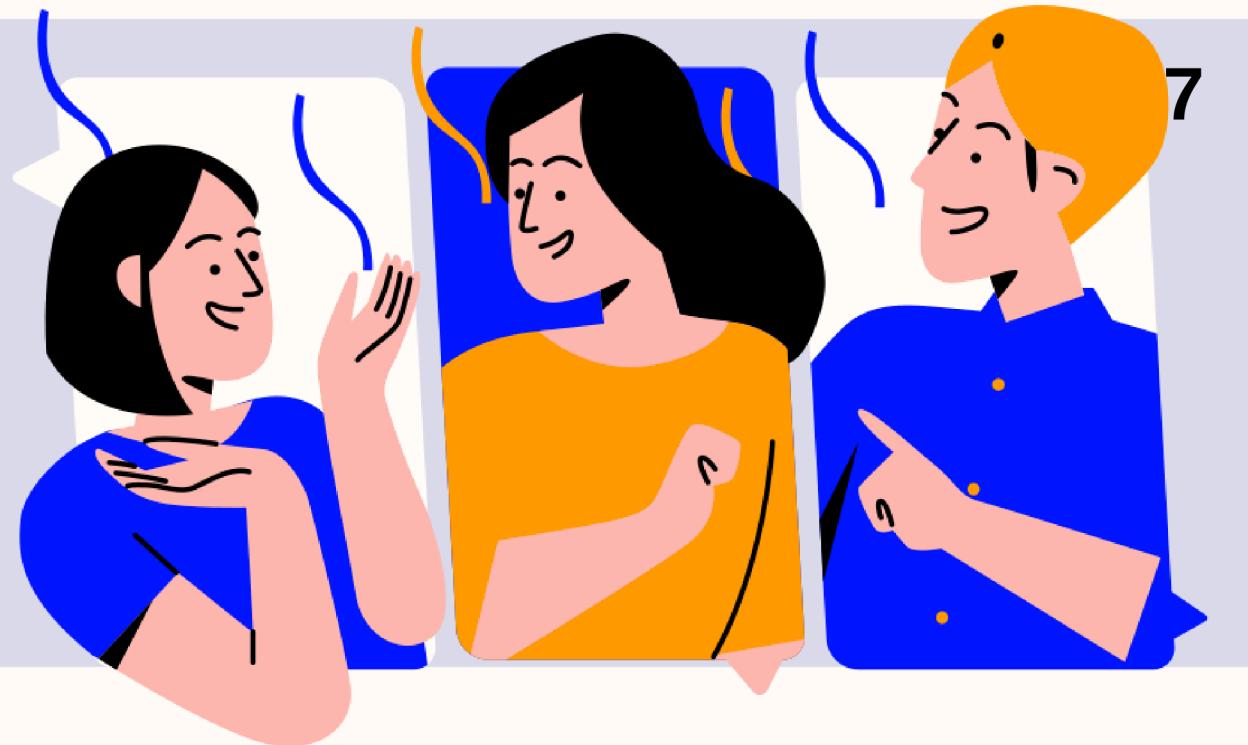
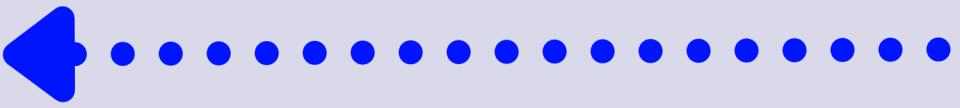
# THE PROBLEMS

Social media managers face

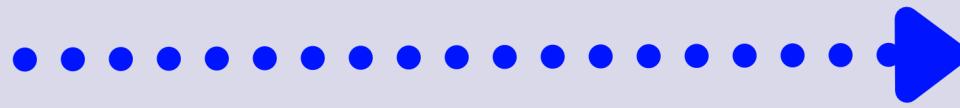


## Problem

The challenges that social media managers face



# Automating Social Media Management



**Solution**  
NLP+CV

# METHODOLOGY

# NLP

Language is designed to be the abstraction of the real world. It should provide an abstraction of long sequence of information.

# CV

Image is the reflection of the real world. It should provide one single clear object, and give people a idea of the topic of our text.

**SOLUTION**

Now, people like to work with

# GPT MODEL



There used to be many classic methods like the word to vec, RNN, and LSTM.

Then, google published "transformer", which use multi-attention layers to abstrurcting the long sequence of information.

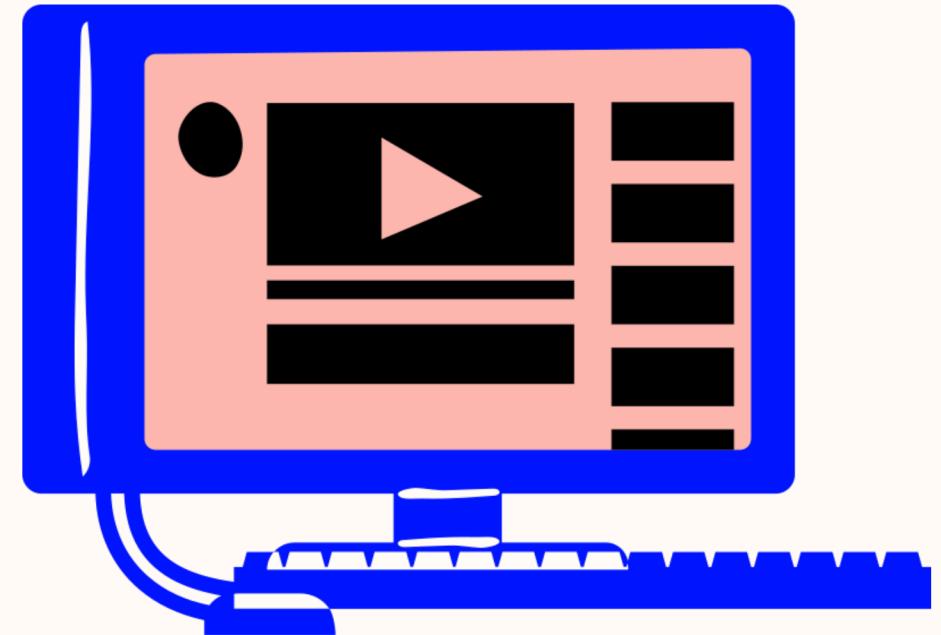
People find that the performance of attention is very well in feature selection, and google published "Bert".

Half a year ago, not a lot of people are interested in the news about GPT-3. Many researchers believe that feature selection (encoder) is more important than generalization. However, an awesome app called "Chat-GPT" has been published.



# HOW IT WORKS

why our machine can generate posts



## LARGE SIZE

According to Moore's law, the power of the hardware is increasing exponentially. Therefore, as time goes on, the model size will also increase at this speed. Thus, the model can keep more information.

## ATTENTION LAYERS

The attention layer gives the model power to further abstract the long sequence of information. Therefore, the attention layer can make sure a large language model generates better results.

## HUMAN FEEDBACK

Illustrating Reinforcement Learning from Human Feedback (RLHF) is just like a more expensive version of the GAN model. This allows the large language model to be more human-friendly while losing some performance of inference.

# STABLE DIFFUSION

A Prompt-Based Image-Generation Model

## PAST ML-BASED IMAGE-GENERATION MODELS:

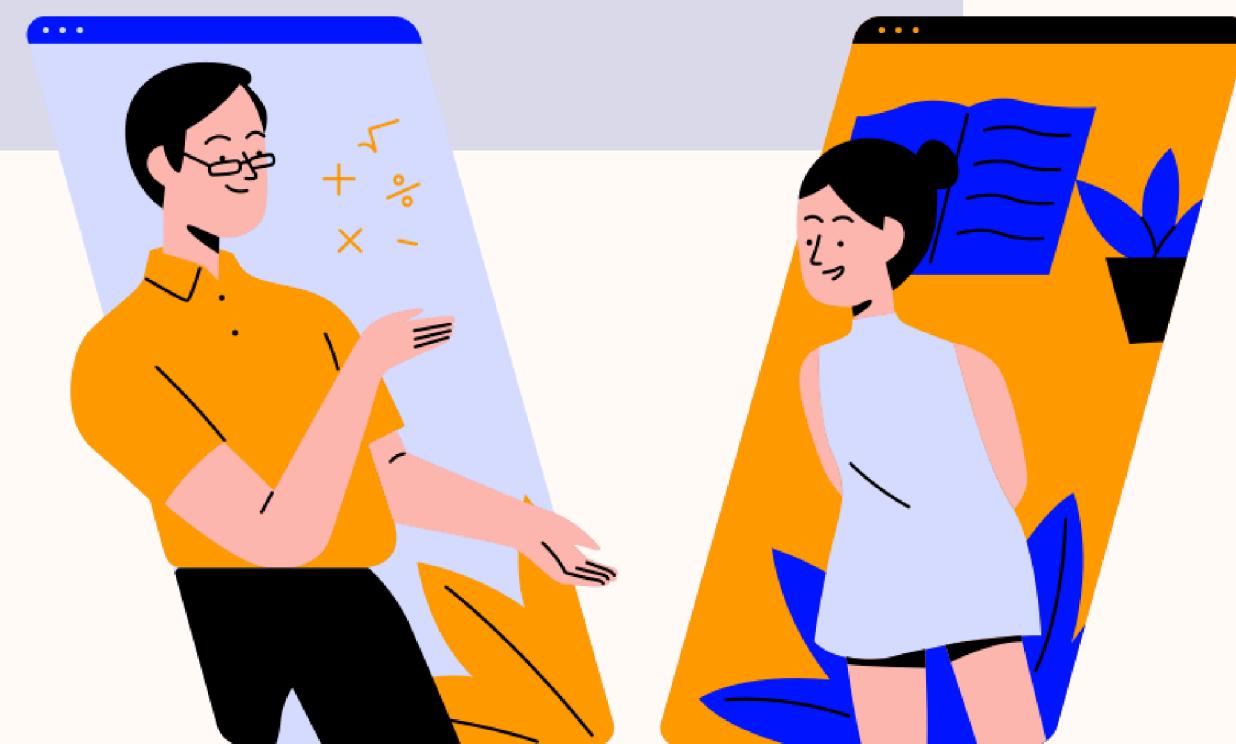
VAE, Autoregressive models, GAN, etc.

## DIFFUSION MODELS:

- Basic Structures: DDPM, score-based models, SDE
- CLIP embeddings, LDM, Stable diffusion
- Huggingface APIs: diffusers, accelerate; provides construction of stable diffusion pipelines.

## OPEN-SOURCE MODEL WEBSITE

- Huggingface, Civitai
  - Popular sd-v15 models:
    - Open-source: Deliberate, Anything, Protagen, Pastel-Mix, etc.
    - Paid: midjourney-v5, DALLE, etc.
- A Powerful Web-UI:  
Stable diffusion Webui



SOLUTION

# CONTROLNET

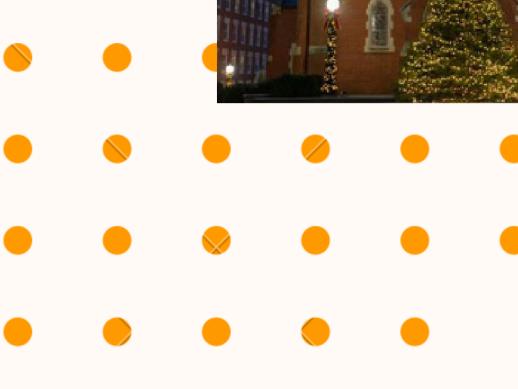
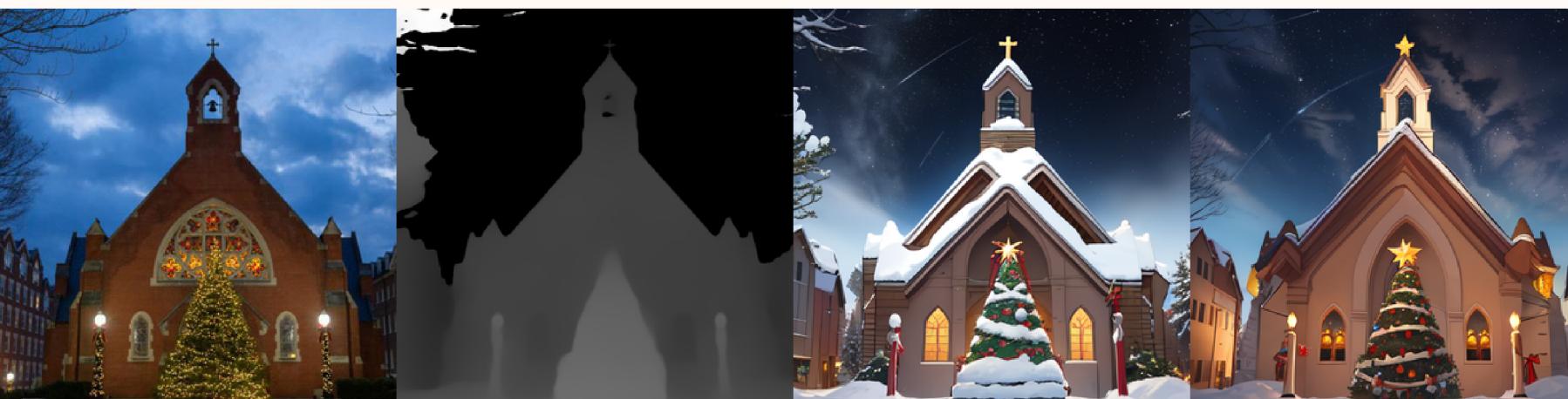
Extra control models for SD models

- Pre-trained ControlNet models provide different conditions for SD models
- It can be trained with limited resources, and, once trained, can be composed with any sd models
- Huggingface has provided controlnet-sd-pipeline composition APIs & corresponding preprocessors

## DEPTHCONTROLNET-REALISTICVISION

**prompt:** "castle with galaxies background"

**neg-prompt:** "monochrome, lowres, bad anatomy, worst quality, low quality"

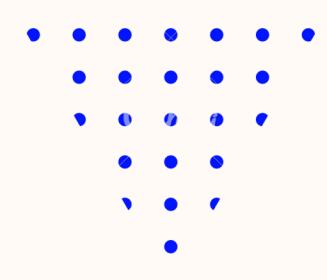


## DEPTHCONTROLNET-PASTELMIX

**prompt:** "bulldog super hero science fiction"

**neg-prompt:** "monochrome, lowres, bad anatomy, worst quality, low quality"





# OUR PROJECT

## How we complete our project



- Backend: Fastapi; Webpage frontend: html+css+js
- Deployed in Colab Pro (High-GPU-RAM and Low-cost)  
+ Google One (200GB for storing models)
- Model Source: civitai
- Developed through VSCode tunnel
- One-to-one (considering the performance of colab pro,  
it's not possible to have many-to-one...)



# PROJECT DEMO TIME



03.

## EVALUATION

Elaborate on what you want  
to discuss.



# PROBLEM EVALUATION



# "DOES OUR PRODUCT MAKE SENSE?"

"YES!"

"YES!"

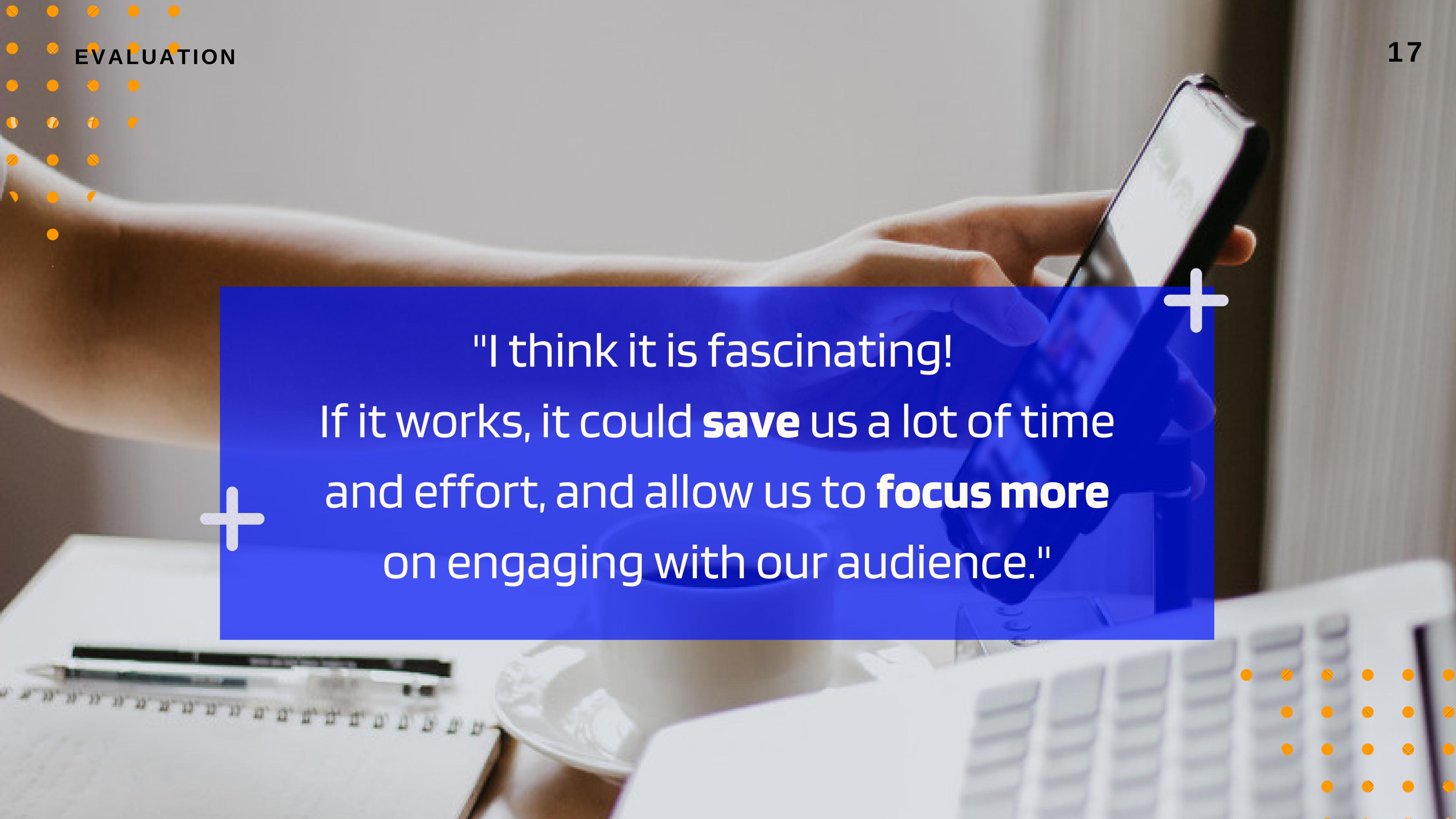
Interview

"YES!"

"YES!"

"YES!"





"I think it is fascinating!  
If it works, it could **save** us a lot of time  
and effort, and allow us to **focus more**  
on engaging with our audience."

# PROBLEM EVALUATION



Balancing Informative  
and Fun Content



Creating Fresh Content  
Despite Similar Topics



Creating High Volume  
of Daily Posts



Efforts to find open-  
copyright pictures

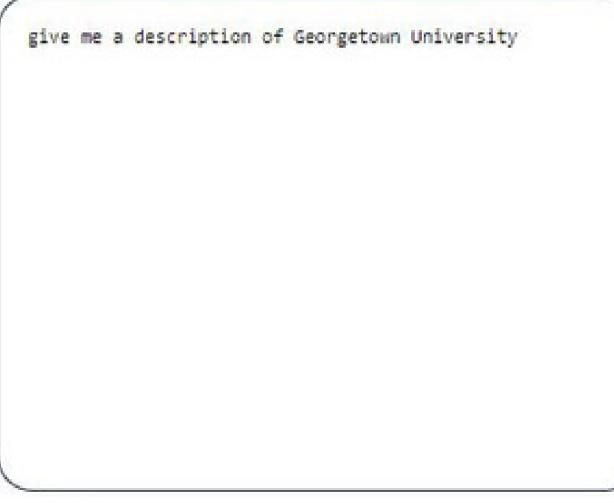
# PRODUCT EVALUATION

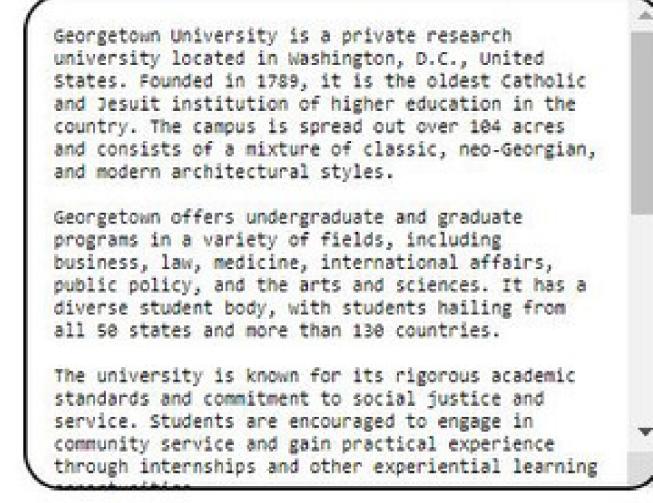
 **Automating Social Media Management**

Project Introduction    Image Generation    Prompt Help    Share 

Share on Media

Image to be Captioned:  
 hiahia (72).png  


ChatGPT Prompt:  
 give me a description of Georgetown University  
  
  
  


Post Text:  
 Georgetown University is a private research university located in Washington, D.C., United States. Founded in 1789, it is the oldest Catholic and Jesuit institution of higher education in the country. The campus is spread out over 184 acres and consists of a mixture of classic, neo-Georgian, and modern architectural styles.  
 Georgetown offers undergraduate and graduate programs in a variety of fields, including business, law, medicine, international affairs, public policy, and the arts and sciences. It has a diverse student body, with students hailing from all 50 states and more than 130 countries.  
 The university is known for its rigorous academic standards and commitment to social justice and service. Students are encouraged to engage in community service and gain practical experience through internships and other experiential learning  


Stable Diffusion Pipeline Parameters:

Prompt:

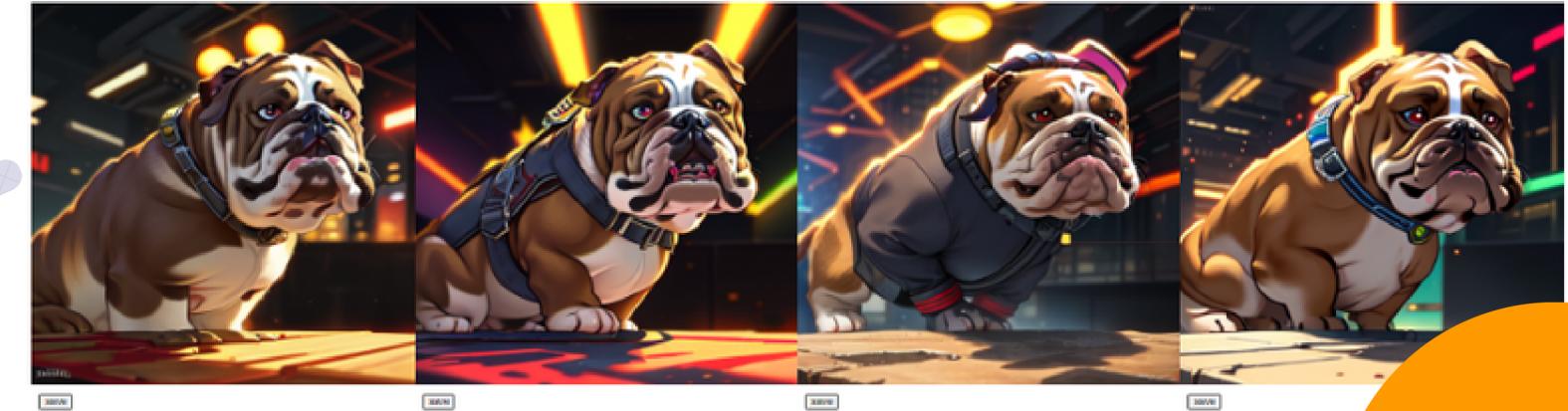
bulldog, super hero, cyberpunk

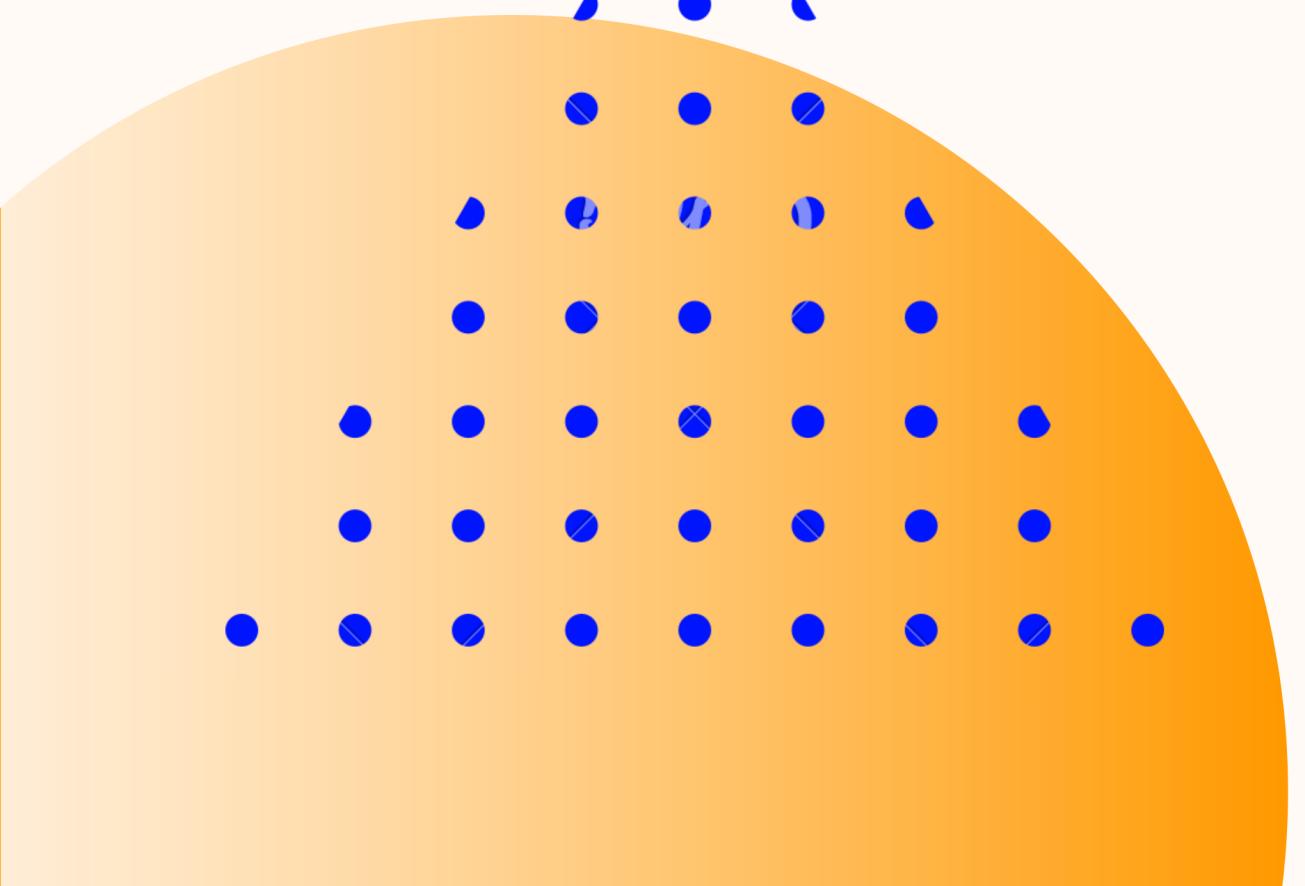
Negative Prompt (Optional):

monochrome, lowres, bad anatomy, worst quality, low quality

CFG Scale: 6.5 Inference Steps: 25 Number of Images: 4 Width: 512 Height: 512 

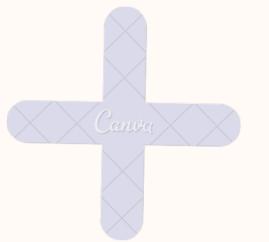
Results:


Further Interview



# THANK YOU!

Any Questions?



# MAIN REFERENCES



- ChatGPT, InstructGPT
- DDPM, LDM, Stable Diffusion
- Huggingface APIs (diffusers, transformers, accelerate)
- Civitai (sd-v15 models)
- FastAPI docs

