Government College of Technology - Coimbatore

Transformative Image Captioning

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PROJECT TITLE

Transformative Image Captioning: Harnessing VisionEncoderDecoderModel and ViTImageProcessor

AGENDA

- ❖ Introduction to Image Captioning
- ❖ Problem Statement
- ❖ Project Overview
- ❖ End Users and Audience
- ❖ Solution and Value Proposition
- ❖ Key Features and Benefits
- ❖ Conclusion

PROBLEM STATEMENT

Challenge:

Inaccurate and Incomplete Image Descriptions

Goal:

Develop an AI-powered system for generating accurate and contextually relevant captions for images.

PROJECT OVERVIEW

- ❑Introduction to VisionEncoderDecoderModel and ViTImageProcessor
- ❑Key Components of the Project Pipeline:
- ❑Image Loading and Preprocessing
- ❑Feature Extraction
- ❑Caption Generation
- ❑Evaluation Metrics: BLEU Score, Accuracy, Relevance

WHO ARE THE END USERS?

- Individuals with Visual Impairments
- Content Creators and Publishers
- Image Search Engines and Platforms
- AI Researchers and Developers

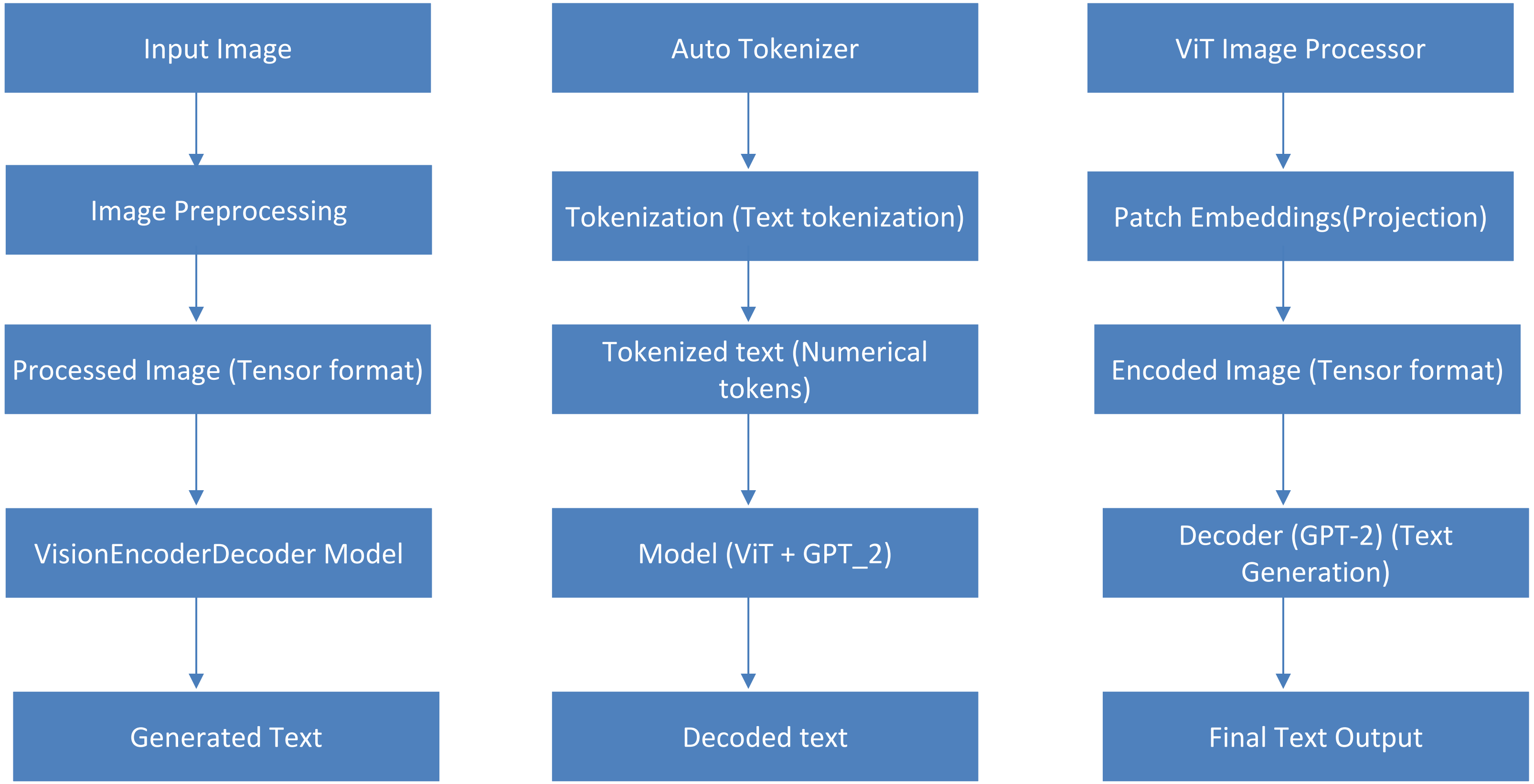
YOUR SOLUTION AND ITS VALUE PROPOSITION

- ✓ Utilizing State-of-the-Art Transformer Models.
- ✓ Seamless Integration of Image Processing and Language Modeling.
- ✓ Accurate and Contextually Rich Image Captions.
- ✓ Enhanced Accessibility and User Experience.
- ✓ Potential for Improving Search Engine Optimization (SEO) for Visual Content.

THE WOW IN YOUR SOLUTION

AI-driven Accuracy: Generate Descriptive Captions with High Precision
Scalability: Process a Wide Range of Images with Efficiency
Customization: Fine-Tune the Model for Specific Domains or Use Cases
Real-World Impact: Improve Accessibility and User Interaction with Visual Content
Future Potential: Expand to Multimodal AI Applications for Comprehensive Content Understanding

MODELLING



Input Image

Image Preprocessing

Processed Image (Tensor format)

VisionEncoderDecoder Model

Generated Text

Auto Tokenizer

Tokenization (Text tokenization)

Tokenized text (Numerical tokens)

Model (ViT + GPT_2)

Decoded text

ViT Image Processor

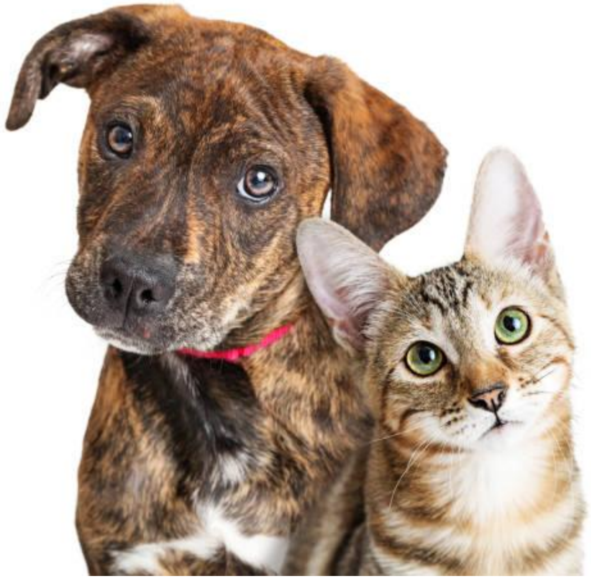
Patch Embeddings(Projection)

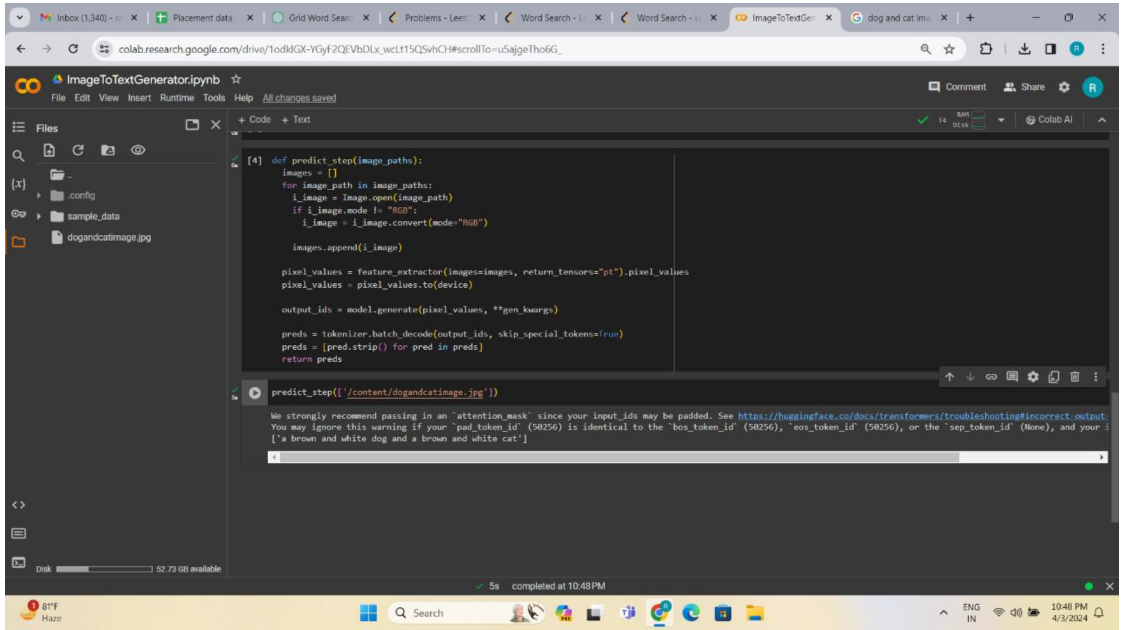
Encoded Image (Tensor format)

Decoder (GPT-2) (Text Generation)

Final Text Output

RESULTS





```
[4] def predict_step(image_paths):
      images = []
      for image_path in image_paths:
        i_image = Image.open(image_path)
        if i_image.mode != "RGB":
          i_image = i_image.convert(mode="RGB")

        images.append(i_image)

      pixel_values = feature_extractor(images=images, return_tensors="pt").pixel_values
      pixel_values = pixel_values.to(device)

      output_ids = model.generate(pixel_values, **gen_kwargs)

      preds = tokenizer.batch_decode(output_ids, skip_special_tokens=True)
      preds = [pred.strip() for pred in preds]
      return preds
```

```
predict_step(['/content/dogandcatimage.jpg'])
```

```
We strongly recommend passing in an `attention_mask` since your input_ids may be padded. See https://huggingface.co/docs/transformers/troubleshooting#incorrect-output
You may ignore this warning if your `pad_token_id` (50256) is identical to the `bos_token_id` (50256), `eos_token_id` (50256), or the `sep_token_id` (None), and your i
['a brown and white dog and a brown and white cat']
```