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Homework 2

MSIS 549

Question 1

Techniques for Model Optimization:

- Pruning: Removing unnecessary model parameters.
- Quantization: Reducing the precision of numerical values.
- Knowledge Distillation: Training a smaller model to mimic a larger one.
- Transfer Learning: Leveraging pre-trained models.
- Batch Normalization: Normalizing layers to speed up training.

AI Application where Speed Matters More

- Real-time Video Processing: Fast processing is essential for live streaming or surveillance, even at the expense of some accuracy.

AI Application where Accuracy Matters More

- Medical Diagnosis Systems: High accuracy is crucial for diagnosing diseases, outweighing the need for speed.

Question 2

Here are three AI features recently added to photo apps like Google Photos, enhancing user experience:

- Improved Photo Editing Suggestions: AI now suggests tailored edits for each photo, like adjusting brightness or contrast, making photo editing easier for users without technical skills.
- Advanced Search Capabilities: Enhanced search features allow users to find photos by text present in the images, turning the app into a comprehensive digital archive accessible through simple queries.

Interactive Memories: AI curates engaging memories, such as "Then and Now" sequences, showing changes over time without any manual effort, enriching the reminiscing experience.

Question 3

Prompt Used: “Depict a bustling futuristic cityscape at dusk, featuring skyscrapers with holographic ads, flying cars, and diverse pedestrians. The city blends high-tech with nature, showcasing neon lights and vertical gardens.”

Strength: SDXL Turbo excelled in creating a highly detailed scene with many elements, making the image look vibrant and full of life.

Weakness: SDXL Turbo struggled with rendering text clearly in the image, leading to text that appears blurred or distorted.

Question 4

Backbone Model of aMUSEd:

The backbone model of aMUSEd is U-ViT. It streamlines the model architecture by eliminating the need for a super-resolution transformer, allowing it to operate effectively at single-stage high resolutions.

Fine-tuning Requirements for Additional Styles:

aMUSEd can be fine-tuned to learn additional styles with only a single image. This flexibility makes it highly adaptable for customized style applications.

Open-Source Status and Benefits:

> Yes, aMUSEd is open-sourced. One significant benefit of open-source models is the ability for the broader community to contribute to and refine the model, accelerating innovation and improving the model through collective efforts. Additionally, open sourcing allows for greater transparency and trust in how the model works and its applications.

Question 5

The dataset used was the Smithsonian Butterflies dataset from Hugging Face.

Dataset shape: (1000, 18)

Number of epochs: dynamic epochs, my code stopped running at 39.