

WEEK 2 REPORT

1. Papers:

a. LoftQ: LoRA-Fine-Tuning-Aware Quantization for Large Language Models

I. Link:

<https://arxiv.org/pdf/2310.08659>

II. Data Collection:

- Encoder-only Model: DeBERTaV3, SQuADv1.1, and ANLI datasets
- Encoder-Decoder Model: BART, summarization datasets: XSum and CNN/DailyMail
- Decoder-only Model: LLAMA-2, two NLG datasets: GSM8K and WikiText-2

III. Key Findings:

- Applying quantization and LoRA fine-tuning together on a pre-trained model typically results in a performance gap on downstream tasks compared to full fine-tuning.
- LoftQ, a new quantization framework, addresses this gap by simultaneously quantizing an LLM and optimising the low-rank initialization for LoRA fine-tuning.

2. Fine Tuning:

- <https://towardsdatascience.com/fine-tuning-large-language-models-llms-23473d763b91>
- https://www.youtube.com/watch?v=eC6Hd1hFvos&t=5s&ab_channel=ShawTalebi
- <https://huggingface.co/blog/peft>

3. Quantization:

- https://www.tensorflow.org/model_optimization/guide/quantization/training
- <https://learn.deeplearning.ai/courses/quantization-fundamentals/lesson/1/introduction>

4. Datasets:

- <https://huggingface.co/datasets/Gustavosta/Stable-Diffusion-Prompts>
- Prompt Generation by Llama and GPT40

Initial Prompt:

""""

women, beautiful, old, grey hair

""""

Final Prompt:

An elderly woman with an ethereal beauty, her features weathered by time but still bearing an air of grace. Her long, silver hair cascades down her back in soft, gentle waves, framing her delicate face. Her eyes are a piercing shade of blue, holding within them a wisdom that comes only with age. She wears a simple, yet elegant dress that drapes over her frail frame, its colours faded but its fabric still soft to the touch. The image is bathed in a warm, golden light, highlighting the woman's wrinkles and creases as if to emphasise the passage of time. In the background, one can see a lush garden filled with blooming flowers, their vibrant colours contrasting beautifully with the woman's grey hair and aged skin

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# llama3

[
{
  "initial_prompt": "beach, sunset, palm trees, relaxation",
  "final_prompt": "A serene beach scene at the golden hour, where the sky is painted with hues of orange, pink, and purple. Palm trees sway gently in the breeze, their leaves rustling softly as the warm sun sets over the horizon. The air is filled with the sweet scent of blooming flowers and the sound of waves gently lapping against the shore. A comfortable beach chair sits empty, inviting the viewer to sit back and relax, with a refreshing cocktail and a good book waiting to be enjoyed. The atmosphere is tranquil, with the only movement coming from the occasional seagull flying overhead, adding to the sense of peace and relaxation."
},
{
  "initial_prompt": "space, stars, galaxy, astronaut",
  "final_prompt": "A stunning vista of the galaxy, with millions of twinkling stars stretching out into the vastness of space. An astronaut floats in the foreground, clad in a sleek white spacesuit, with a helmet that reflects the infinite beauty of the cosmos. The stars shine with a mesmerizing intensity, their light dancing across the astronaut's visor as they gaze out into the unknown. A nearby planet hangs suspended in the blackness, its atmosphere glowing with a soft blue light. The scene is bathed in an otherworldly silence, with the only sound being the gentle hum of the astronaut's life support systems."
},
{
  "initial_prompt": "city, night, skyscrapers, busy",
  "final_prompt": "A vibrant cityscape at night, where towering skyscrapers pierce the sky like shards of glass, their peaks disappearing into the darkness. The streets are alive with the hum of activity, as people from all walks of life hurry to and fro, their faces aglow with the neon lights of billboards and storefronts. Cars zip past, their headlights casting a kaleidoscope of colors across the wet pavement, while the sounds of honking horns, chatter, and music fill the air. The atmosphere is electric, with the city's energy palpable in every corner, from the bustling streets to the glittering high-rise buildings that seem to touch the stars."
},
],
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{
  "initial_prompt": "forest, mist, trees, mysterious",
  "final_prompt": "A mystical forest, shrouded in a veil of mist that swirls around the ancient trees like a living entity. The air is cool and damp, filled with the scent of damp earth and decaying leaves. Towering trunks rise like sentinels from the fog, their gnarled branches twisted and tangled in a way that seems almost magical. The silence is oppressive, punctuated only by the occasional snapping of twigs or hooting of owls, adding to the sense of mystery and enchantment. In the distance, a faint glow emanates from an unseen source, casting an ethereal light on the mist-shrouded landscape."
},
{
  "initial_prompt": "mountain, snow, cabin, cozy",
  "final_prompt": "A secluded mountain cabin, nestled among the snow-covered pines like a hidden treasure. The cabin's wooden walls are weathered to a warm brown, and smoke drifts lazily from the chimney, carrying the scent of crackling wood and roasting marshmallows. The surrounding mountains rise up like giants, their peaks lost in the swirling clouds of snow. The air is crisp and cold, with a hint of woodsmoke and pine needles, and the only sound is the soft crunch of snow underfoot. Inside the cabin, a warm fire crackles, casting a golden glow over the plush furnishings and inviting the viewer to come in, relax, and let the stresses of the world melt away."
}
]
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# GPT4o

[
{
  "Initial Prompt": "men, handsome, young, curly hair",
  "final Prompt": "A young man exuding charisma and charm, his handsome features accentuated by a wide smile. His curly hair is tousled, giving him a carefree appearance, while his deep brown eyes sparkle with youthful energy. He wears a tailored, casual blazer over a crisp white shirt, embodying a blend of sophistication and approachability. The background is a lively street scene, with people and colorful storefronts adding vibrancy to the composition. The warm afternoon sunlight casts soft shadows, highlighting the contours of his face and emphasizing the confidence in his posture."
},
{
  "Initial Prompt": "dog, friendly, small, fluffy",
  "final Prompt": "A small, fluffy dog with an irresistibly friendly demeanor, its bright eyes sparkling with joy. Its fur, a blend of white and caramel hues, is immaculately groomed, giving it a cloud-like appearance. The dog wears a playful bandana around its neck, adding to its charming personality. It's sitting on freshly cut grass, surrounded by colorful flowers that sway gently in the breeze. The sunlight filters through the trees, creating a soft, dappled light that enhances the dog's fluffy fur and casts playful shadows on the ground."
},
{
  "Initial Prompt": "landscape, mountain, serene, sunset",
  "final Prompt": "A breathtaking mountain landscape at sunset, where the golden hues of the fading sun bathe the peaks in a warm glow. The towering mountains, their slopes covered in lush greenery, stand majestically against the vibrant sky. In the foreground, a serene lake reflects the colors of the sunset, creating a mirror-like surface that doubles the beauty of the scene. A few scattered clouds catch the last rays of light, adding a touch of pink and orange to the horizon. The whole scene radiates tranquility, inviting the viewer to pause and soak in the natural beauty."
},
],
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{
  "Initial Prompt": "cat, mysterious, black, night",
  "final Prompt": "A sleek, black cat with an air of mystery, its emerald green eyes glowing in the dim light of the night. Its fur is glossy, reflecting the faint moonlight as it moves silently across the cobbled street. The cat pauses under a flickering streetlamp, its gaze fixed intently on something unseen. In the background, the silhouette of an old stone building looms, adding to the enigmatic atmosphere. Wisps of fog curl around the cat's paws, enhancing the sense of intrigue and making it appear almost ethereal."
},
{
  "Initial Prompt": "cityscape, futuristic, vibrant, night",
  "final Prompt": "A futuristic cityscape at night, glowing with vibrant neon colors that reflect off the sleek, glass skyscrapers. The skyline is dominated by towering buildings, their facades covered in dynamic digital displays and holographic advertisements. Elevated highways weave through the city, their lanes filled with hovercars zipping past in streaks of light. Pedestrians in futuristic attire move along glowing walkways, while drones buzz overhead, adding to the bustling atmosphere. In the distance, a colossal, illuminated tower stands as a beacon of progress, casting its light over the entire metropolis."
}
}
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