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# Title:AWQ: Activation-aware Weight Quantization for LLM Compression and
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Authors:[Ji Lin](https://arxiv.org/search/cs?searchtype=author&query=Lin,+J),

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- > Abstract:Large language models (LLMs) have transformed numerous AI
- > applications. On-device LLM is becoming increasingly important: running LLMs
- > locally on edge devices can reduce the cloud computing cost and protect
- > users' privacy. However, the astronomical model size and the limited
- > hardware resource pose significant deployment challenges. We propose
- > Activation-aware Weight Quantization (AWQ), a hardware-friendly approach for
- > LLM low-bit weight-only quantization. AWQ finds that not all weights in an
- > LLM are equally important. Protecting only 1% salient weights can greatly
- > reduce quantization error. To identify salient weight channels, we should

- > refer to the activation distribution, not weights. To avoid the hardware-
- > inefficient mix-precision quantization, we mathematically derive that
- > scaling up the salient channels can reduce the quantization error. AWQ
- > employs an equivalent transformation to scale the salient weight channels to
- > protect them. The scale is determined by collecting the activation
- > statistics offline. AWQ does not rely on any backpropagation or
- > reconstruction, so it generalizes to different domains and modalities
- > without overfitting the calibration set. AWQ outperforms existing work on
- > various language modeling and domain-specific benchmarks (coding and math).
- > Thanks to better generalization, it achieves excellent quantization
- > performance for instruction-tuned LMs and, for the first time, multi-modal
- > LMs. Alongside AWQ, we implement TinyChat, an efficient and flexible
- > inference framework tailored for 4-bit on-device LLM/VLMs. With kernel
- > fusion and platform-aware weight packing, TinyChat offers more than 3x
- > speedup over the Huggingface FP16 implementation on both desktop and mobile
- > GPUs. It also democratizes the deployment of the 70B Llama-2 model on mobile
- > GPUs.

Comments: | MLSys 2024 Best Paper Award. Code available at: [this https://github.com/mit-han-lab/llm-awq)

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Subjects: | Computation and Language (cs.CL)

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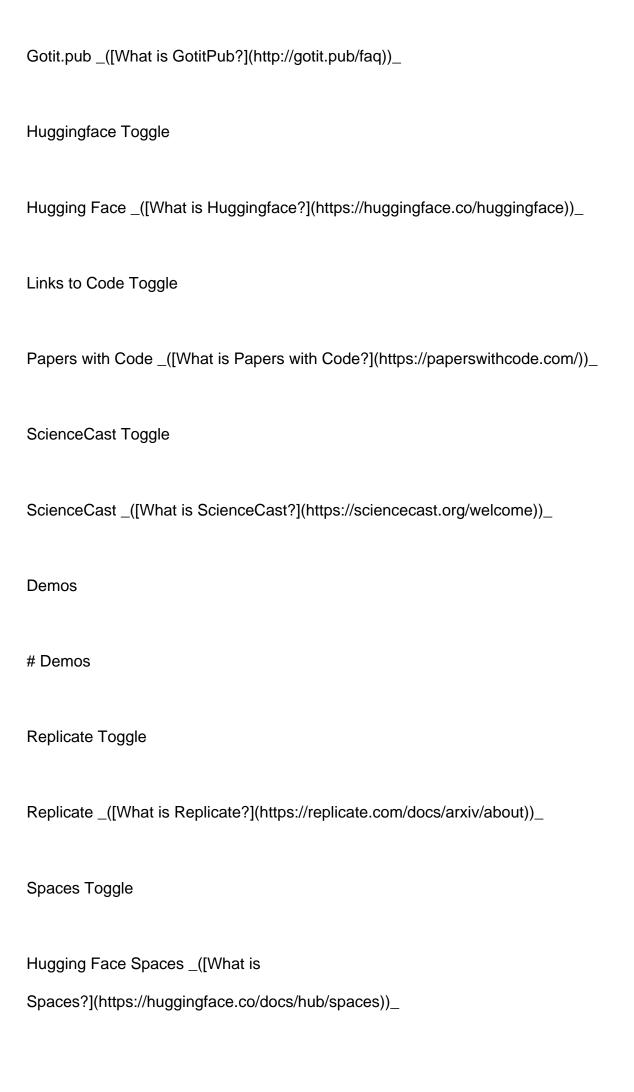
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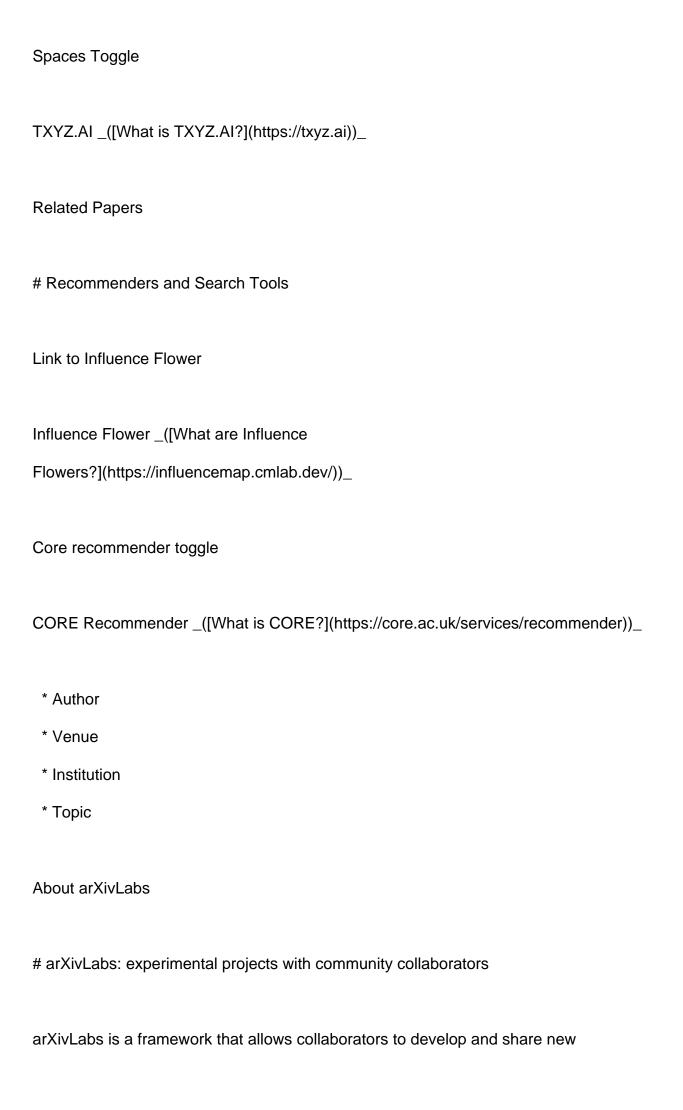
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