GLM-4.5V and GLM-4.1V-Thinking: Towards Versatile Multimodal Reasoning with Scalable Reinforcement Learning

GLM-V Team

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Abstract

We present GLM-4.1V-Thinking and GLM-4.5V, a family of vision-language models (VLMs) designed to advance general-purpose multimodal understanding and reasoning. In this report, we share our key findings in the development of the reasoning-centric training framework. We first develop a capable vision foundation model with significant potential through large-scale pre-training, which arguably sets the upper bound for the final performance. We then propose **R**einforcement **L**earning with **C**urriculum **S**ampling (**RLCS**) to unlock the full potential of the model, leading to comprehensive capability enhancement across a diverse range of tasks, including STEM problem solving, video understanding, content recognition, coding, grounding, GUI-based agents, and long document interpretation. In a comprehensive evaluation across 42 public benchmarks, GLM-4.5V achieves state-of-the-art performance on nearly all tasks among open-source models of similar size, and demonstrates competitive or even superior results compared to closed-source models such as Gemini-2.5-Flash on challenging tasks including Coding and GUI Agents. Meanwhile, the smaller GLM-4.1V-9B-Thinking remains highly competitive—achieving superior results to the much larger Qwen2.5-VL-72B on 29 benchmarks. We open-source both GLM-4.1V-9B-Thinking and GLM-4.5V. Code, models and more information are released at `https://github.com/zai-org/GLM-V`.

(A) Comparison with baselines.

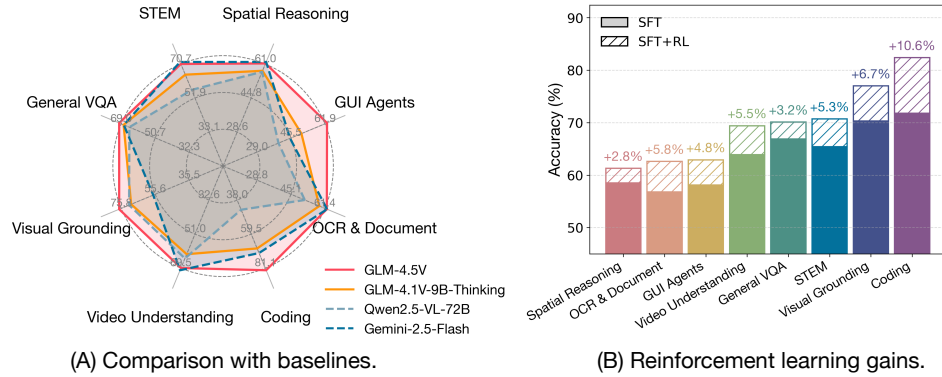(B) Reinforcement learning gains.

Figure 1: (A) GLM-4.5V achieves efficient scaling based on its compact predecessor, GLM-4.1V-9B-Thinking, and compares favorably with Gemini-2.5-Flash, according to benchmark assessments. Table 2 presents full performance comparison. (B) Reinforcement learning substantially boosts the model's performance, with gains of up to +10.6% when experimented with GLM-4.5V.