

**Paper Title:**

Reflexion: Language Agents with Verbal Reinforcement Learning

**Paper Link:**

<https://arxiv.org/pdf/2303.11366.pdf>

**1. Summary****1.1 Motivation**

- Large language models (LLMs) increasingly used as goal-driven agents interacting with environments
- Traditional RL requires extensive training samples and expensive model fine-tuning
- Need more sample efficient ways for language agents to learn from limited experience

**1.2 Contribution**

- Propose Reflexion, a framework where agents learn via linguistic self-reflection not weight updates
- Agent verbally reflects on feedback, maintains text in episodic memory
- More flexible than scalar rewards for nuanced feedback and transparent memory

**1.3 Methodology**

- Reflexion uses Actor, Evaluator, and Self-Reflection models
- Actor generates actions, Evaluator provides rewards
- Self-Reflection converts rewards to verbal feedback as memory
- Memory provides useful context to improve on next trial

**1.4 Conclusion**

- Demonstrated gains over baselines on decision-making, reasoning, programming tasks
- Self-reflection more effective than rewards or memory alone
- Emergent capability of LLMs to learn via trial, error and self-reflection

**2. Limitations**

- Relies on quality of self-evaluation and memory encoding
- No guarantee of optimality, can get stuck in local minima

- Memory capacity limited due to LLM constraints

### **3. Synthesis**

This paper introduces Reflexion as a promising new reinforcement learning paradigm for language agents. By learning via transparent self-reflection instead of opaque weight updates, Reflexion agents can acquire complex behaviors more efficiently and interpretablely. The demonstrated capability of LLMs to self-improve through verbal feedback opens exciting avenues for developing more human-like learning. However, issues around optimality, memory and self-assessment remain. Overall, this work provides a strong empirical foundation for leveraging self-supervised learning through deliberate practice.