LLaDA: Large Language Diffusion Models

Autoregressive LLM

Ken

- : LLM

- : LLM
- : LLaDA masking diffusion 8B LLaMA3 8B

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- : in-context learning instruction-following

-
- AR LLM

-
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- LLaDA Eq.3, Eq.4 remask

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$$p(x) = \prod_{i=1}^{L} p(x_i \mid x_{<i})$$

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- : 8B

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- LM GPT-2

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- masked : MaskGIT

LLaDA

- Forward: t $t \sim U[0, 1]$

LLaDA

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- Reverse:

LLaDA

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masked token CE :

$$\mathcal{L}(\theta) = -\mathbb{E}_{t,x_0,x_t}\left[\frac{1}{t}\sum_{i=1}^{L}\mathbf{1}[x_t^i = M]\log p_\theta(x_0^i \mid x_t)\right]$$

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$$-\mathbb{E}_{p_{\text{data}}(x_0)}[\log p_\theta(x_0)] \leq \mathcal{L}(\theta)$$

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- Sampling remask low-confidence remasking

- : ARM baseline LLaDA

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- : FLOPs 6

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8B Base

- LLaDA 8B Base vs LLaMA2 7B Base

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- HumanEval: 35.4 vs 34.8

SFT

- LLaDA SFT RL instruction-following

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Reversal Curse

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- Table 4

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3

- 8B LM LLM

3

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- reversal reasoning AR

- $< 10^{23}$ FLOPs

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-

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- : AR

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- : remask step CFG

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- : RLHF/RLAIF agent AR

- LLaDA AR LLM 8B

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- reversal

- LLaDA AR LLM 8B
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- RL AR

- LLaDA AR LLM 8B
- reversal
- RL AR
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Q&A

Q1. BERT

A. mask $t \sim U[0, 1]$

Q2. reversal

A.

Q3.

A. 1 1step AR step - sampling /

- Paper: Large Language Diffusion Models (Nie et al.)

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