Towards a Better Understanding of AI

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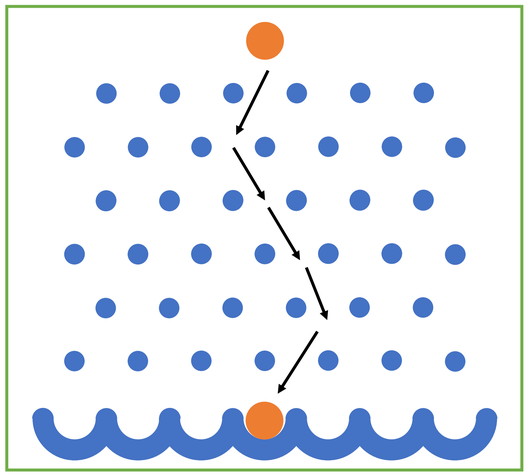
1. Abstract

Artificial intelligence is everywhere. It's been implemented into graphic design, advertisements, search engines, and even teaching. Tech companies are in an arms race to develop the most accurate and highest performing AI, paying top dollar for power large-scale data centers. But as we use AI, it uses energy. But what determines the amount of energy used? And how do AIs work in the first place? My name is Ian Hastings, and I analyzed different sizes of AI models and compared their energy and power usage.

2. Background



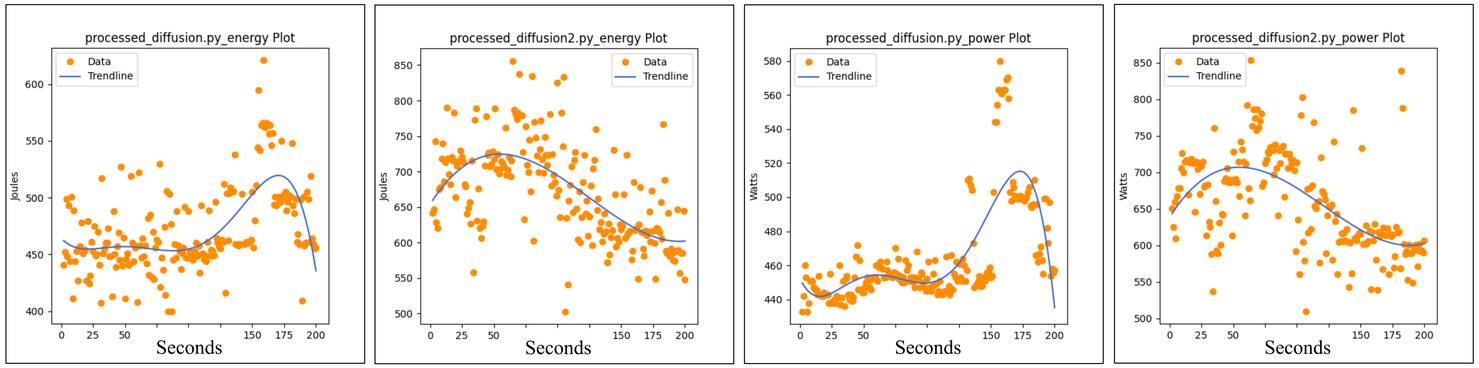
Plinko Diagram

AI Process:
- First: The input text is tokenized
- Then: Relationships between tokens are computed
- Finally: Output is decoded

- Like plinko, the input is shifted based on the parameters and training of the AI

3. Method and Results

Base Model Energy | Refined Model Energy | Base Model Power | Refined Model Power



The energy and power consumed by the refined model is much higher than the base model.

4. Results

- Prompt: "A hyper realistic photograph of a dew-covered spider web sparkling in the morning sun. Each strand is individually discernible, with water droplets reflecting the vibrant colors of a nearby flower."

- Precision vs Consumption

Refined Diffusion Model

Base Diffusion Model

5. Next Steps

- Run more models to compare performance across different sizes
- Compare very different model structures and their consumption of power
- Use a performance monitor, like Vampir, to analyze every detail

6. References and Acknowledgements

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