A discussion on 'The Hardware Lottery'

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A quote to begin

The debate: "how much future algorithms will differ from models such as deep neural networks"

"The risk you attach to depending on domain-specialized hardware is tied to your position on this debate. Betting heavily on specialized hardware makes sense if you think that future breakthroughs depend on pairing deep neural networks with ever-increasing amounts of data and computation." [1]

[1] Sara Hooker, "The Hardware Lottery," *Communications of the ACM* 64, no. 12 (December 2021): 58–65, https://doi.org/10.1145/3467017.

0. ~~Introduce "the debate"~~
1. Share our first impressions of the paper
2. Connect this paper to our research directions
3. Open up to discussion questions
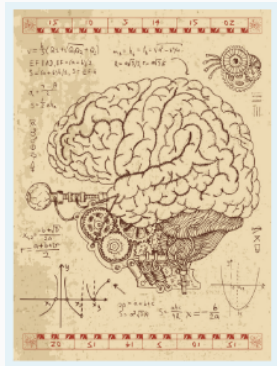
"Our own cognitive intelligence is inextricably both hardware and algorithm. We do not inhabit multiple brains over our lifetime."[2]

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[2]Hooker, "The Hardware Lottery."

Show of hands: Raise your hand if you have ever worked on a project where hardware-related factors directly influenced a research decision.

My first impressions of 'The Hardware Lottery'

- **What appealed:** Broad and deep perspective on the co-evolution of hardware/software/algorithms, and the dependence of research ideas on these relationships throughout time
- **What surprised:** The use of biology to extend the metaphor of "hardware lottery", including detailing the possible risk of currently being in one
  - development of human skill to describe inefficiency of model training
  - the brain's energy usage as an example of *how we may be in a current hardware lottery*
- **Unusual opinion:** Even at such a massive scope of analysis, this paper still manages to offer actionable insights at an individual level.
  - e.g., a call for cheap/easy tools to benchmark algorithmic performance against various hardware

Your first impressions of 'The Hardware Lottery'

- **What appealed to you:**

- **What didn't:**

- **What *surprised* you:**

- **An unusual opinion of yours:**

Given the article's prediction that "**the gap between the winners and losers** [of the hardware lottery] **will grow**"[3], what are some possible consequences of this gap?

In terms of your own research?

Socially, culturally, economically?

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[3]Hooker, "The Hardware Lottery."

Question 2

If your area of research does not involve ML directly, what policies, norms, or standards influence how you can do your research?

What does your research depend on that you have little influence over?

That you tend to ignore?

What are some examples of platforms or tools we use today that have succeeded due to "winning the hardware lottery"?

What trends in ML keep this position secure?

What social trends (e.g., privacy norms, regulations) could cause this position to weaken?

Three discussion questions

1. Given the article's prediction that "**the gap between the winners and losers** [of the hardware lottery] **will grow**"[4], what are some possible consequences of this gap? Socially? In terms of your own research? What are some possible advantages if this happens?

2. If your area of research does not involve ML directly, what policies, norms, or standards influence how you can do your research? What does your research depend on that you have little influence over, or that you tend to ignore?

3. What are some examples of platforms or tools we use today that have succeeded due to "winning the hardware lottery"? What trends in ML keep this position secure? What social trends could cause this position to weaken?

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[4]Hooker, "The Hardware Lottery."