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Greg Nordin

Jeremy Howard

@jeremyphoward

For those that hope (or worry) that LLMs will do breakthrough scientific research, I've got good (or bad) news:

LLMs are particularly, exceedingly, marvellously ill-suited to this task. (if you're a researcher, you'll have noticed this already)

Here's why

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Jeremy Howard

@jeremyphoward · 21h

Breakthrough research requires either:

1. Going in a totally new and unexpected direction that everyone decided long ago was stupid, or
2. Finding some extraordinary new experimental data that means we have to change our theories

LLMs can't run experiments, so we'll focus on 1

16

18

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Jeremy Howard

@jeremyphoward · 21h

It's not helpful to just say "LLMs can't reason", since clearly they do some things which humans would use reasoning for.

But LLMs are, first and foremost, fuzzy subgraph matching machines (at *massive* scale*).

3

15

267

33K

Jeremy Howard

@jeremyphoward · 21h

In other words (to over-simplify a bit), LLMs largely work by fuzzily finding & interpolating concepts found in their training sets.

Because of the fuzziness of the search, and scale of the training set, this can give some pretty impressive results.

But!...

5

8

266

39K

Jeremy Howard

@jeremyphoward · 21h

Absolutely any time I try to explore something even slightly against commonly accepted beliefs, LLMs *always* just rehash the commonly accepted beliefs.

As a researcher, I find this behaviour worse than unhelpful. It gives the mistaken impression that there's nothing to explore

19

51

591

42K

Jeremy Howard

@jeremyphoward · 21h

To be fair, it's not just LLMs. This is true of the research community too.

For instance, @planetmoney's latest ep includes an interview with a Nobel prizewinning economist who was called a "charlatan" bv reviewers when he

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@jeremyphoward

Co-founder of FastDotAI, UQ School of AI, and Stanford HAI

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1/9



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Greg Nordin
@GregNordin

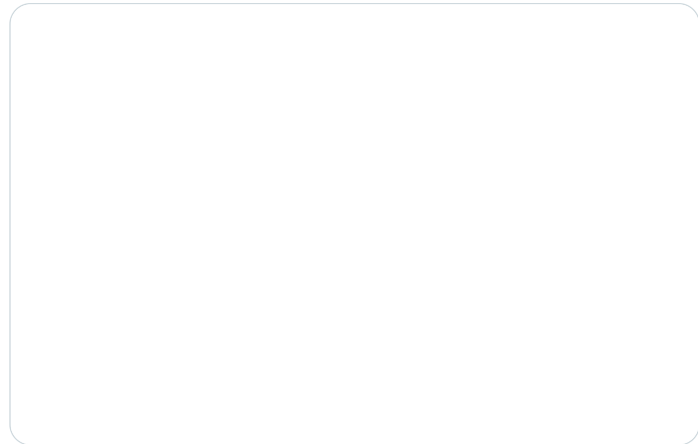
...

...which is something Douglas Engelbart pointed out in 1962!

dougengelbart.org/pubs/augment-3...

4 42 342 54K

Jeremy Howard @jeremyphoward · 21h ...
PS: Here's Engelbart's conclusions -- that in 1962 we needed an "urgent" plan for human capability augmentation. Maybe we should get onto that?



4 14 156 16K

Jeremy Howard @jeremyphoward · 21h ...
PPS: Twice I've tenaciously done a thing that all experts told me was dumb -

1. Used profit optimisation for insurance pricing, not classic actuarial analysis. I founded a successful company based on the idea, and today everyone uses my approach. Actuaries told me it was stupid

1 3 116 10K

Jeremy Howard @jeremyphoward · 21h ...
2. Trained a general purpose language model on a large generic corpus, and fine-tuned it for downstream tasks. Today it's the standard approach for nearly all NLP, but at the time all my NLP friends told me it definitely wouldn't work so don't bother trying.

3 2 124 13K

Jeremy Howard @jeremyphoward · 21h ...
So I do know a bit of what it takes to do breakthrough scientific research -- and it's a very very different thing to what LLMs are trained to do!

5 2 83 12K

Jeremy Howard @jeremyphoward · 16h ...
Just going to highlight some good points in the replies now:

Julian Harris @julianharris · 16h
Replying to @jeremyphoward
I think sometimes people think LLMs are good at creating new ideas because they're new to THEM, but in reality have already been invented by someone else. So often I came up with a cool new idea at Google only to find someone had already come up with it & implemented it as ...
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Jeremy Howard @jeremyphoward · 16h ...

Dan Brickley @danbri · 16h
Replying to @jeremyphoward
There is potential also in being an enabler for interdisciplinary research

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Jeremy Howard
@jeremyphoward
Co-founder
@FastDotAI
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there is potential also in being an enabler for interdisciplinary research - finding non-obvious links between human research in fields that speak different scholarly languages but poke at a common underlying reality. Whether they can go deeper than reading-list-tool, dunno

1 1 31 9.5K

Jeremy Howard @jeremyphoward · 16h

Knut Jägersberg @JagersbergKnut · 16h

Replying to @JagersbergKnut and @jeremyphoward

Another application I see is literature review and synthesis and identifying connections in a semi automated manner. That does not depend on novelty as much as like coming up with a new kind of cure for a disease or creating something one can patent.

 2
 2
 20
 8.7K

Jeremy Howard @jeremyphoward · 16h

PS: In case it wasn't obvious, by "LLMs" I'm referring to the class of models that goes by that name at present.

Some future model, which might end up getting put into the "LLM" category, could of course have totally different capabilities and constraints.

1 1 31 7.8K

Jeremy Howard @jeremyphoward · 16h

For people living in the present (like me, for instance), I think it's useful to understand what these models are good at right now.

(I understand that some people like to make predictions about future capabilities, and that's fine, but it's not what I'm doing.)

4 2 36 7.4K

Greg Nordin  
@GregNordin

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