

Things not covered in course but worth your attention

Machine Learning and Data Mining, 2022

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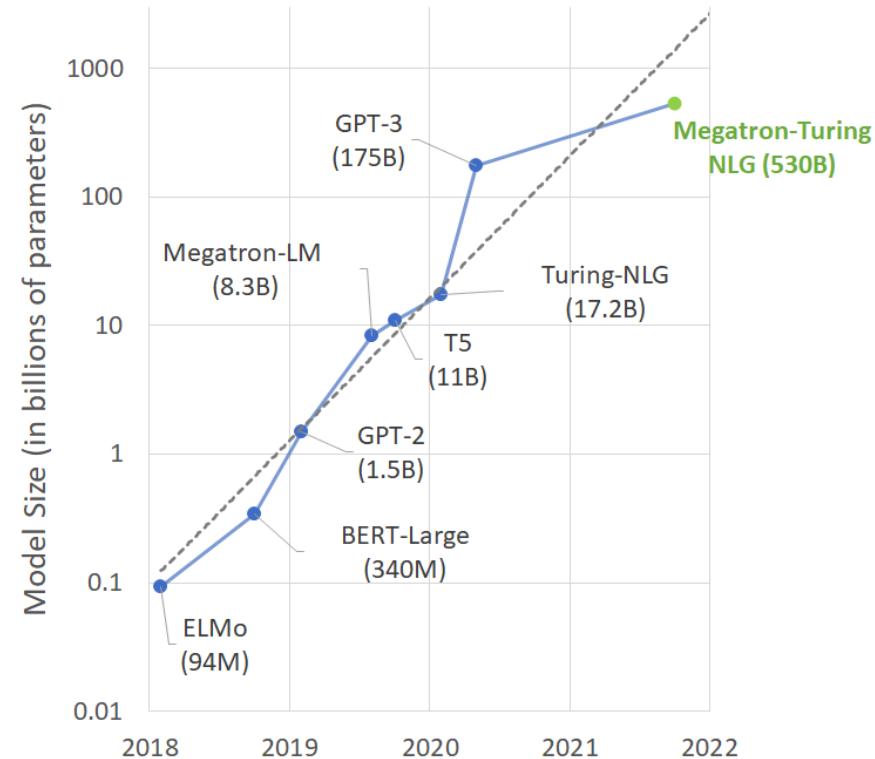


LAMBDA • HSE

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Natural language and sequence modelling

- ▶ Old era: RNN, LSTM, etc.
- ▶ New era: Transformers, “Attention is all you need”
- ▶ Racing for the largest model:

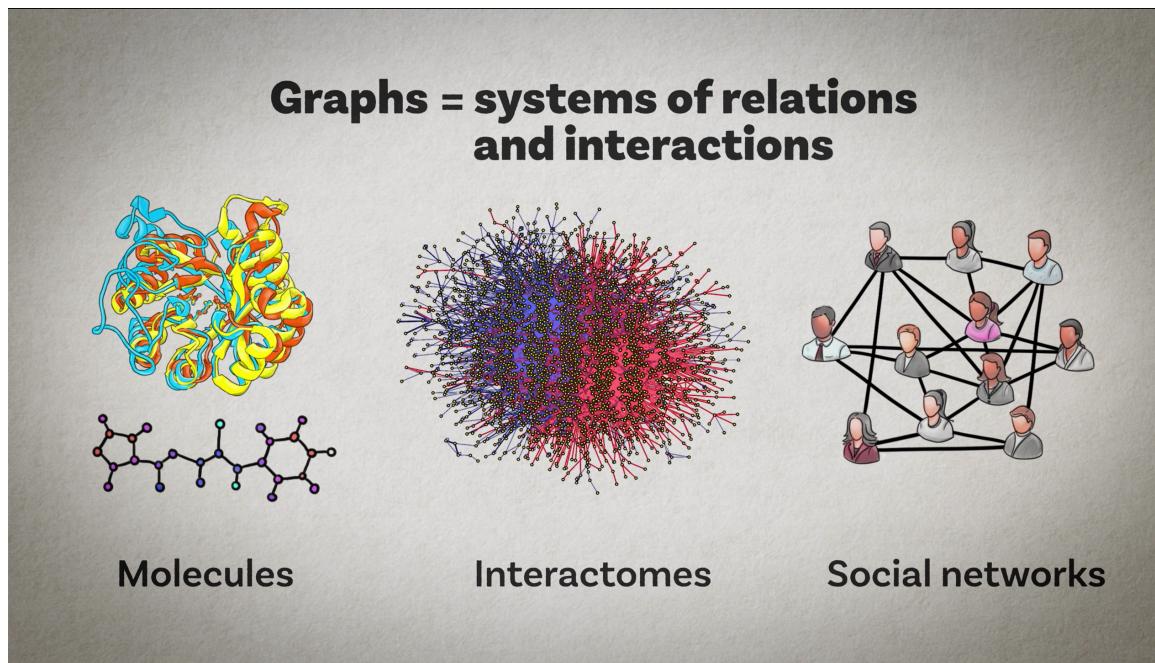


<https://developer.nvidia.com/blog/using-deepspeed-and-megatron-to-train-megatron-turing-nlg-530b-the-worlds-largest-and-most-powerful-generative-language-model/>

Graph neural networks

- ▶ How to work with arbitrarily shaped data?
- ▶ Check out this awesome video by Michael Bronstein:

<https://www.youtube.com/watch?v=w6Pw4MOzMu0>



ICLR 2021 Keynote - "Geometric Deep Learning: The Erlangen Programme of ML" - M Bronstein

Other generative models

- ▶ Normalizing flows http://akosiorek.github.io/ml/2018/04/03/norm_flows.html
- ▶ Diffusion models <https://lilianweng.github.io/lil-log/2021/07/11/diffusion-models.html>
- ▶ Structured probabilistic models,
Deep Boltzmann Machines, See, e.g., part 3 from: <https://www.deeplearningbook.org/>
Monte-Carlo sampling

Machine learning in science

- ▶ ML methods find their application in multiple fields of science, including biology and medicine, material science, astro- and particle physics, quantum computing, and many more
- ▶ ML boosts the progress significantly, we may expect a boom of amazing ML-supported discoveries in the nearest future
 - We see some already: e.g., things like AlphaFold are expected to revolutionize drug discovery
- ▶ Now is a very good time to join scientific research labs and contribute to creating these discoveries!
 - Check out our lab activity: https://www.instagram.com/hse_lambda/

Thank you!



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