Mnacho Echenim
small evolutions : Patrick Reignier

Grenoble INP-Ensimag

2025-2026

Outline

Foreword

- There is an increasing concern on the environmental impact of deep learning
- Hardware concerns will not be addressed here
  - `https://bouveres.pages.ensimag.fr/jied/ressources/2021-2022/20211109-ImpactNumerique.pdf` (in french)
- We will focus on energy consumption

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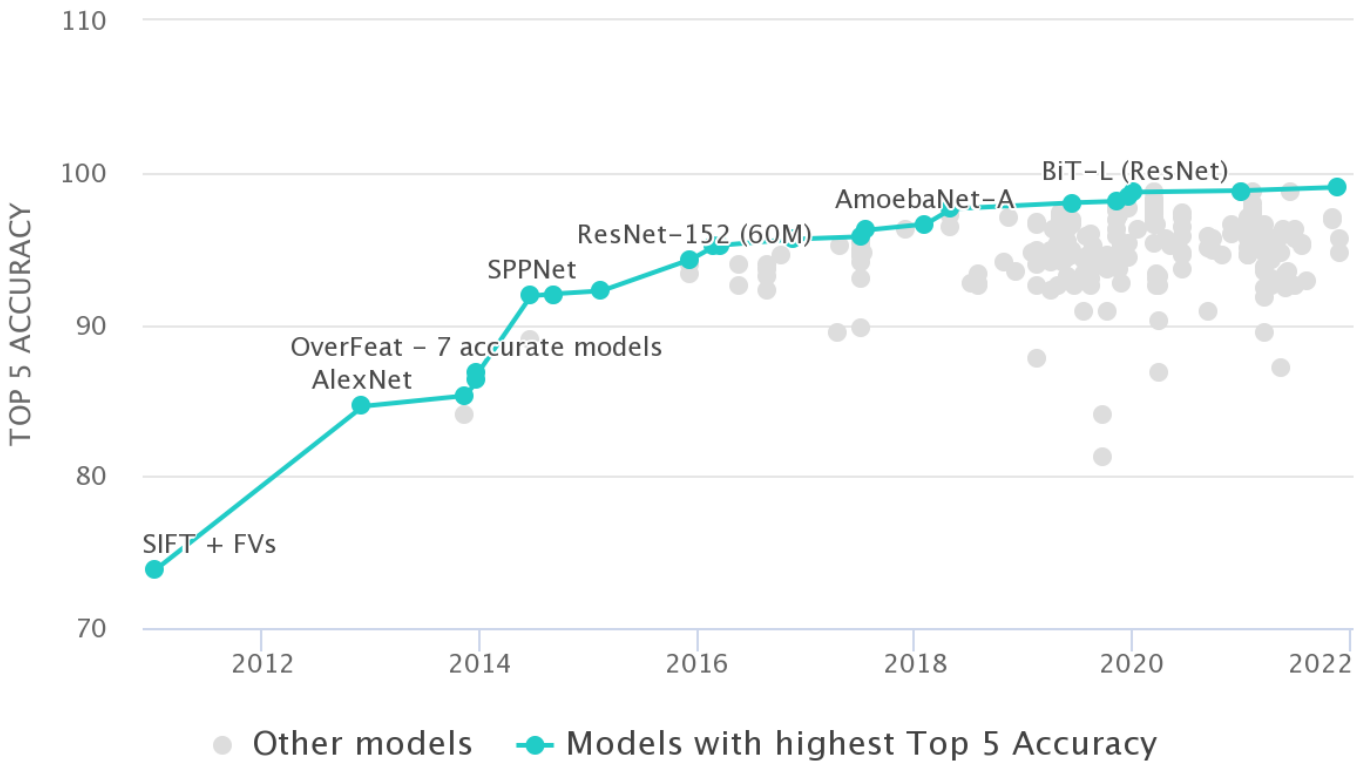
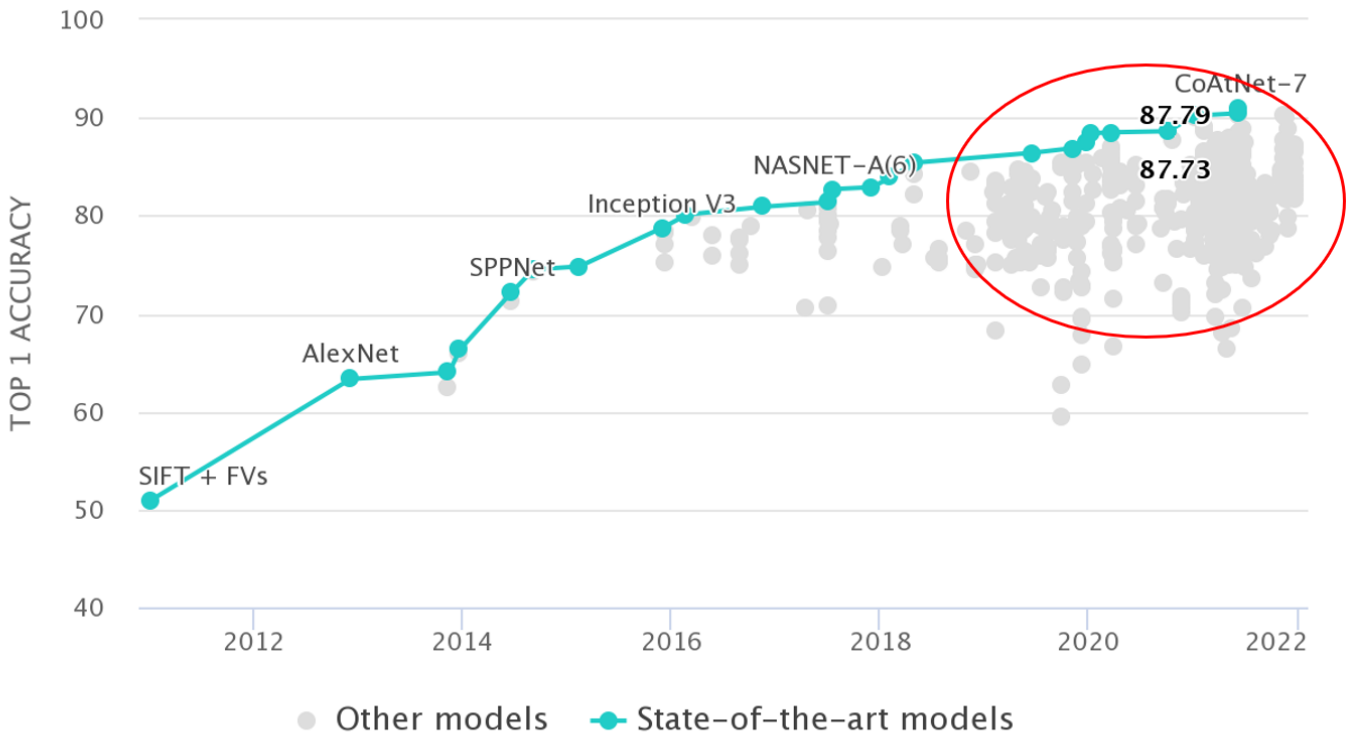
- Results in December 2021 (`https://paperswithcode.com/sota/image-classification-on-imagenet`):



A focus on accuracy (2)

- Still a lot of ongoing research



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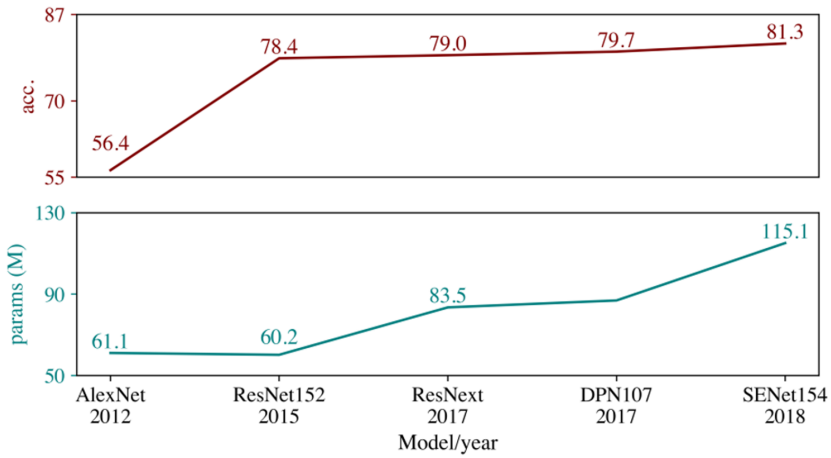

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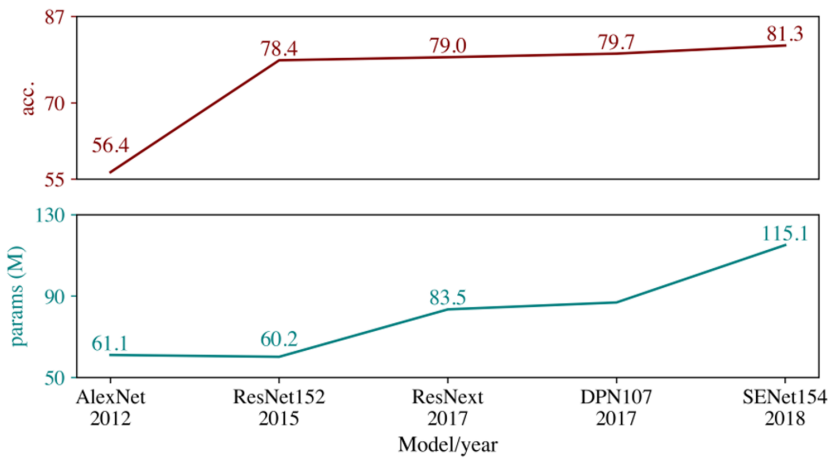

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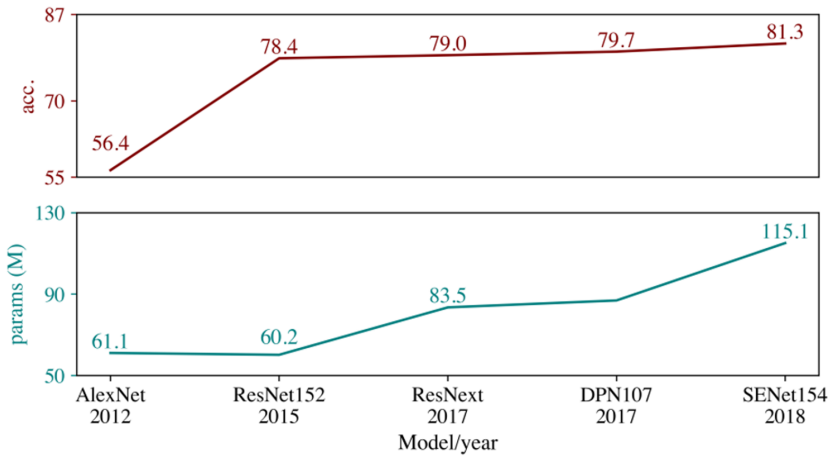

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- This has to be done for each tested network architecture

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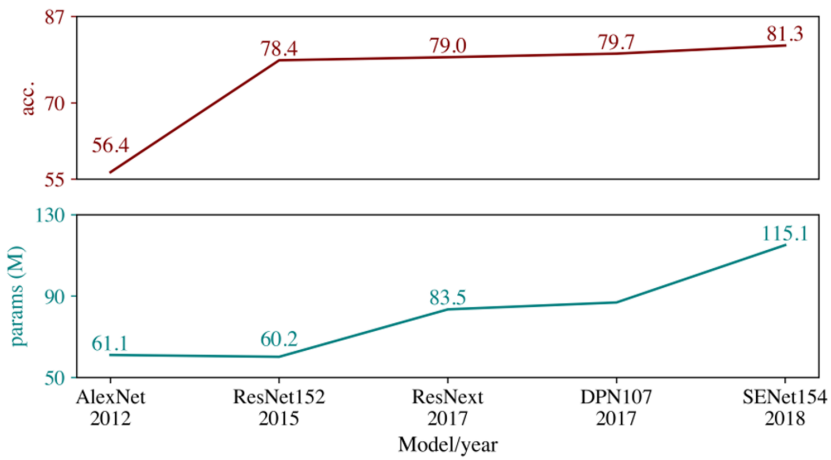
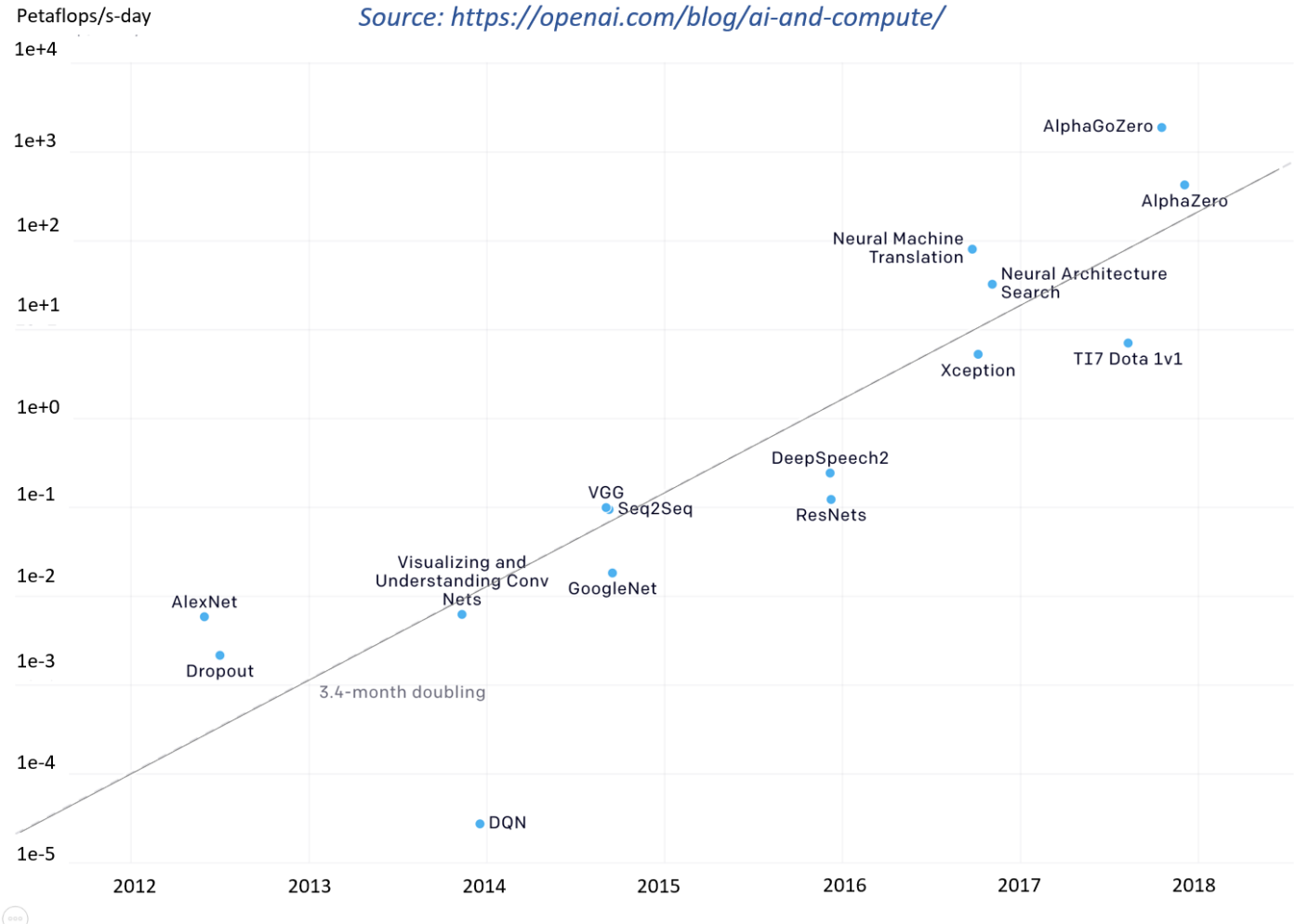


The computational cost of an improved accuracy

The search for more accurate models has entailed an **exponential growth** in **computational costs**

Source: https://openai.com/blog/ai-and-compute/



Towards efficiency

Suggestion (`https://arxiv.org/pdf/1907.10597.pdf`): we should distinguish Red AI and Green AI

- Goal of Red AI: improve the state of the art
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- By making the trained models publicly available

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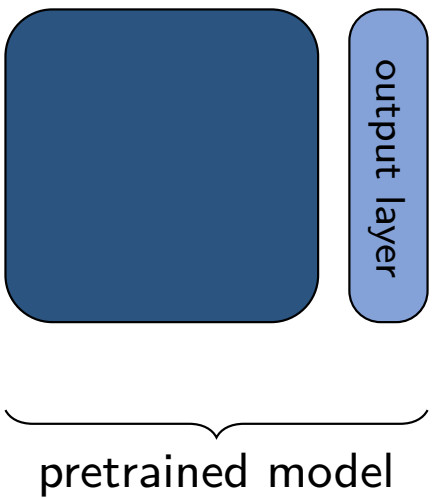

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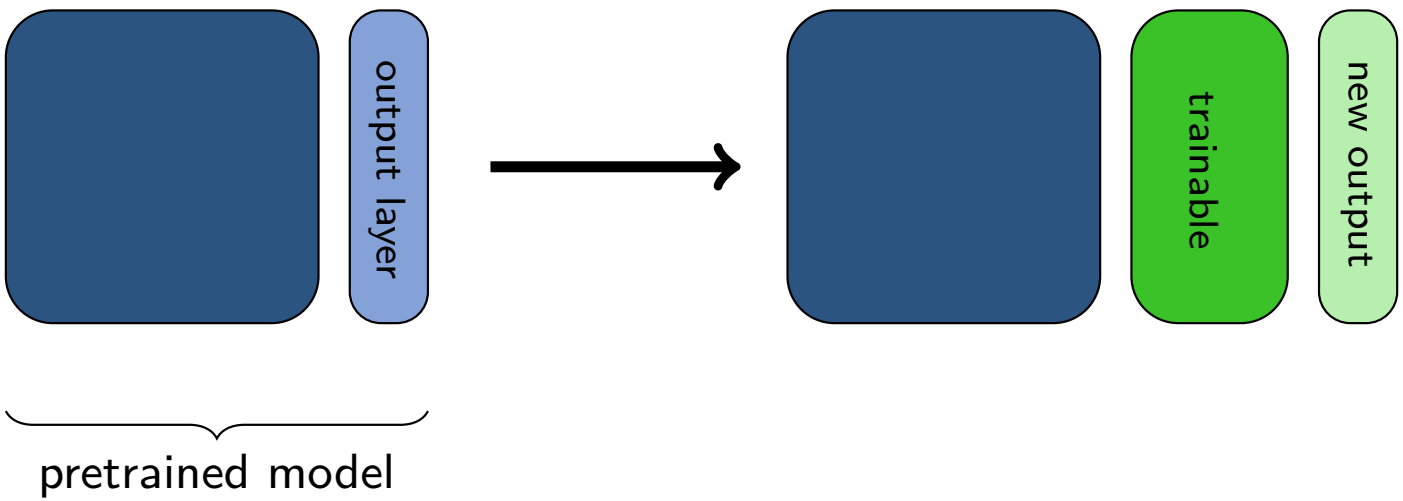

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- It is a topic to be aware of
  - Especially during internships on applications of Deep Learning
- Additional resources
  - Lecture notes by Anne-Laure Ligozat (in french): `https://ecoinfo.cnrs.fr/wp-content/uploads/2021/04/Cours_CentraleSupelec_IA_responsable-1.pdf`

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