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ARTIFICIAL INTELLIGENCE IN THE ENVIRONMENTAL INDUSTRY

Christian Nilsen

December 10, 2024

Over the next 5 years, what impact do you think artificial intelligence (AI) will have on your work?

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Do you think it will help or hurt your organization?

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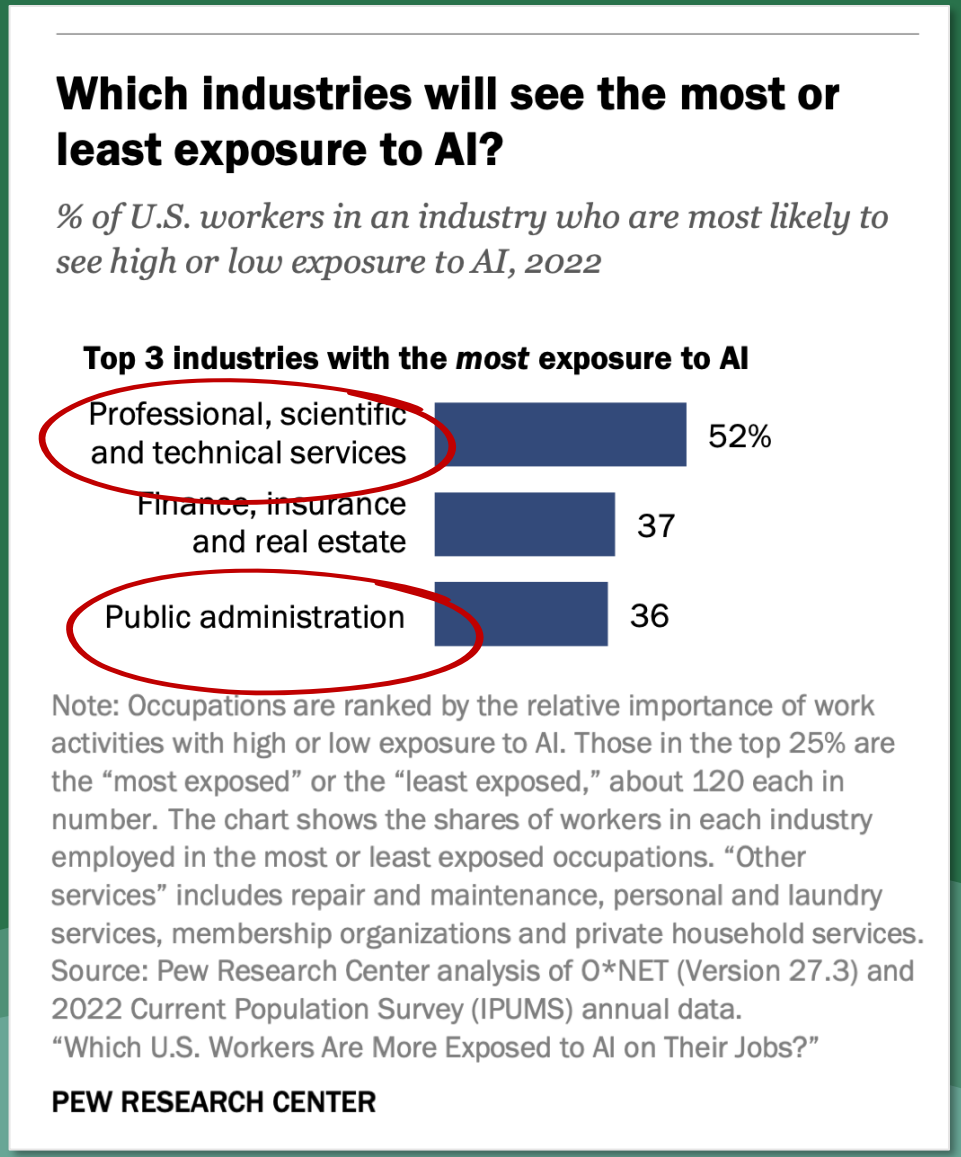
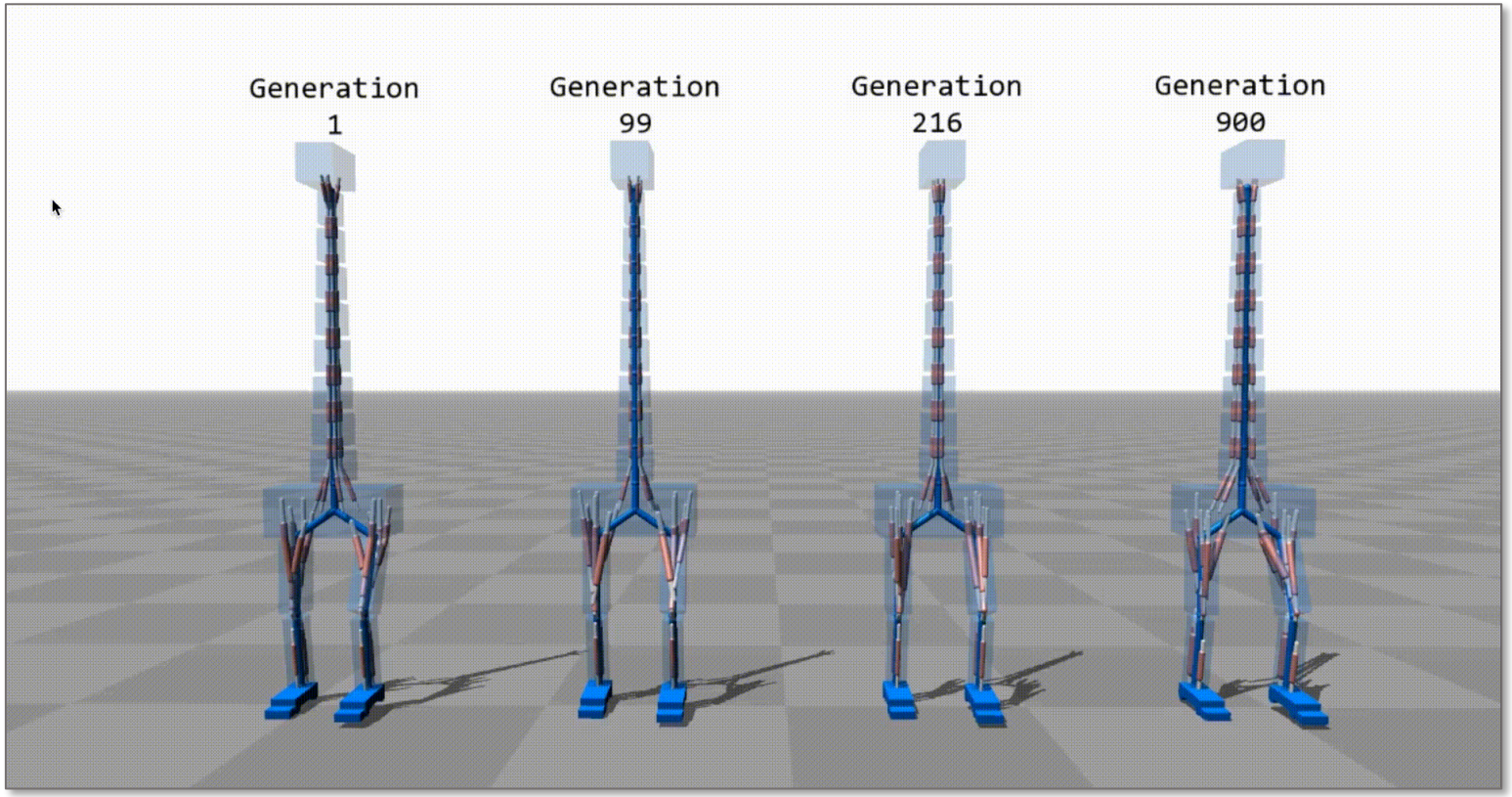
The environmental industry is expected to be one of the “most exposed” to AI



What is AI?

AI is software that learns how to perform a particular task.



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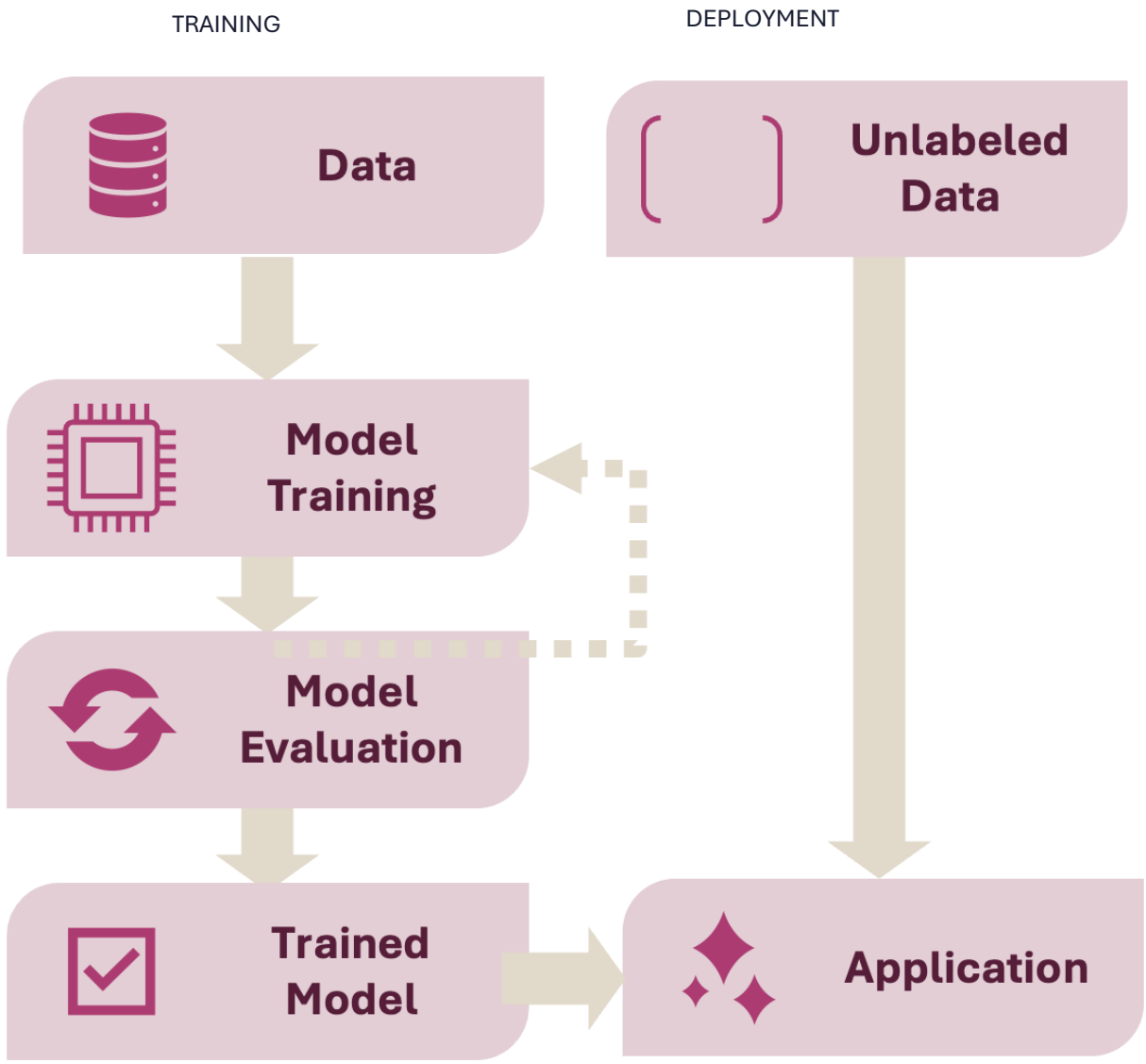

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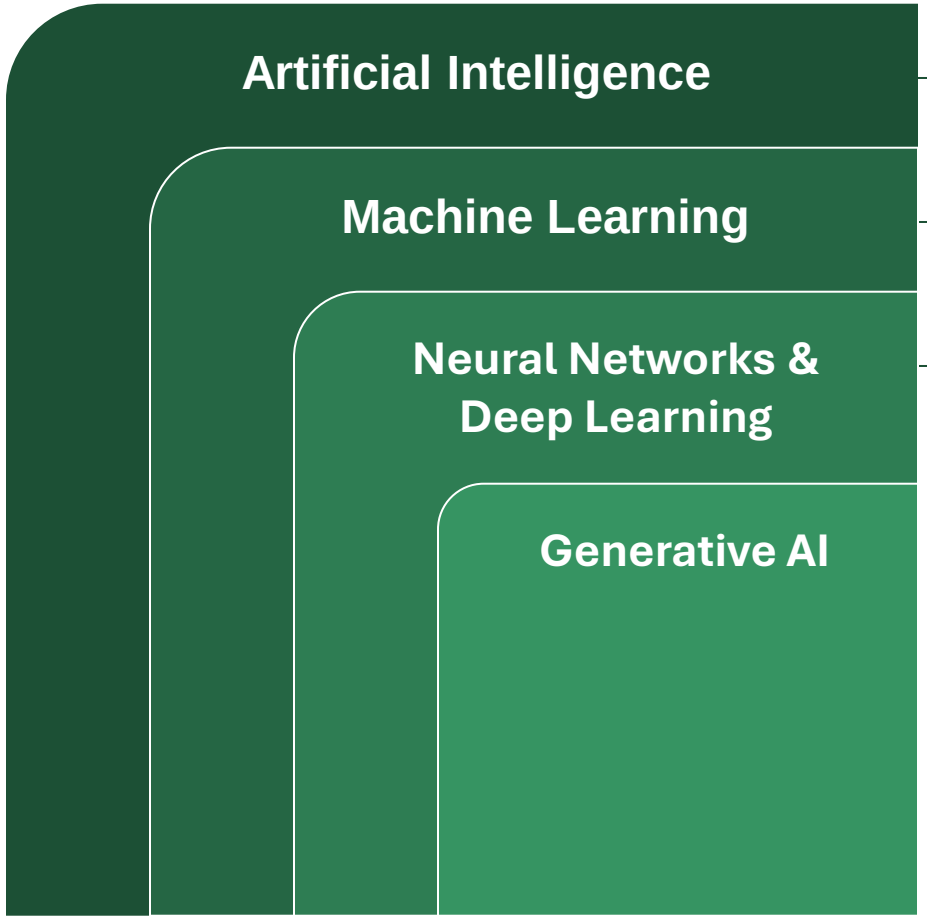
The evolution of AI



- Expert Systems
- Decision Trees, Linear Models, Clustering...
- Neural Networks, Deep Reinforcement Learning, Deep Belief Networks...

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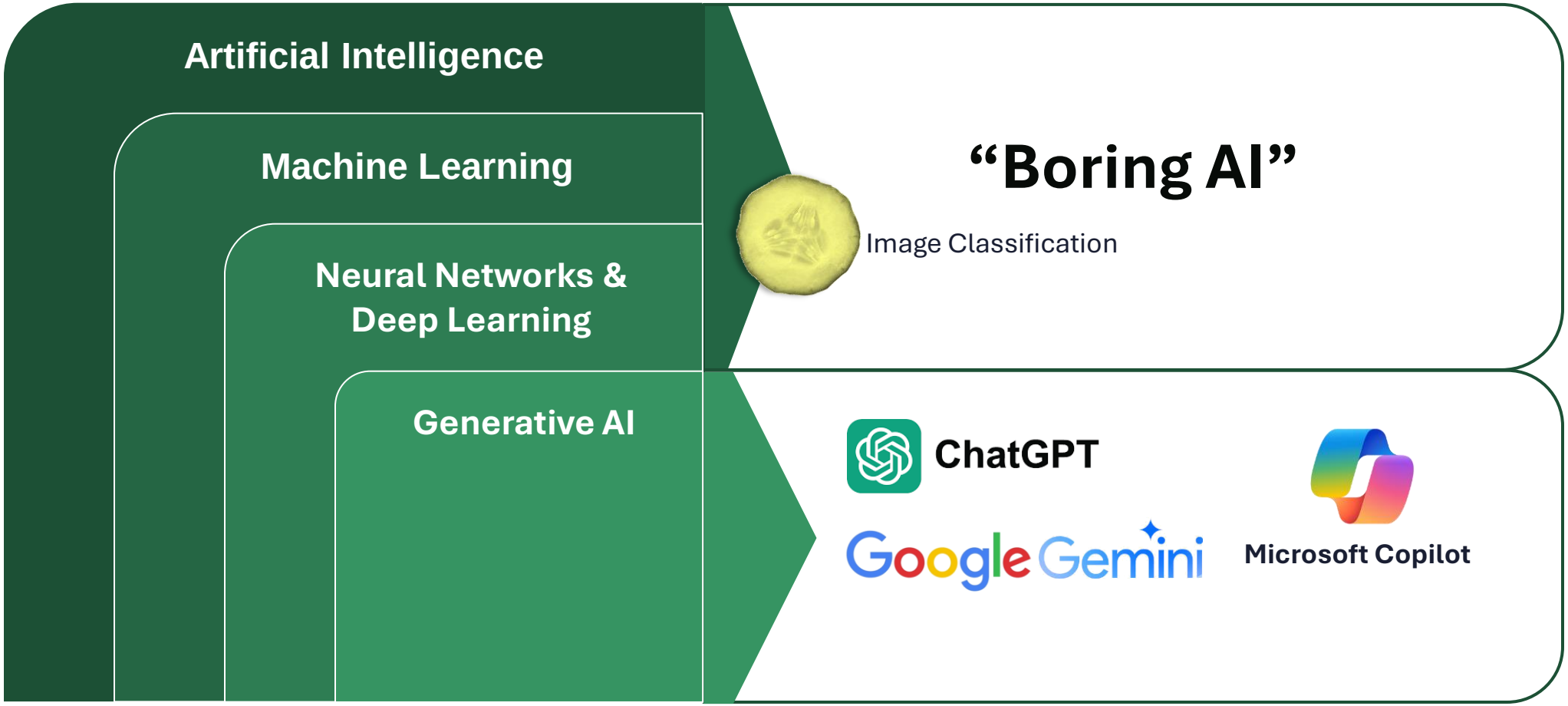
The evolution of AI



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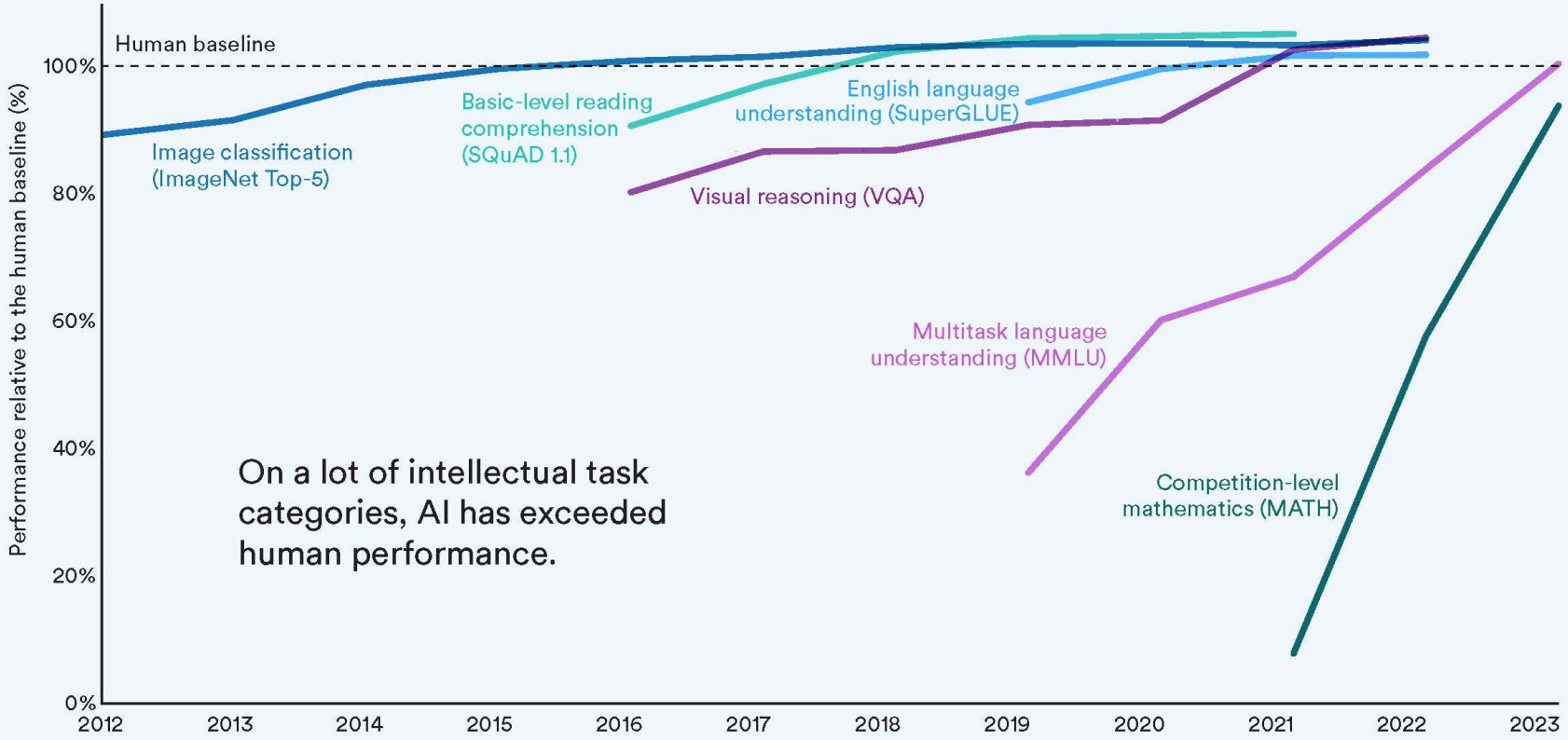
Select AI Index technical performance benchmarks vs. human performance

Source: AI Index, 2024 | Chart: 2024 AI Index report

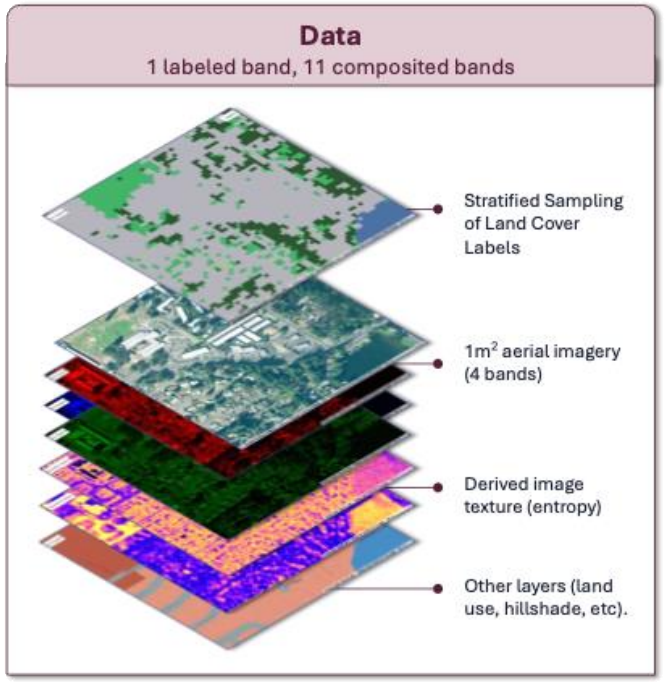


An explosion of data

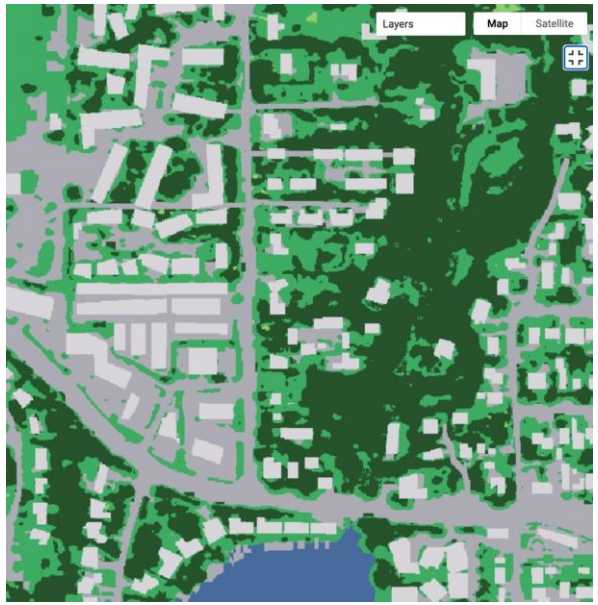
Image Classification

Puget Sound Stormwater Heatmap

Model Training



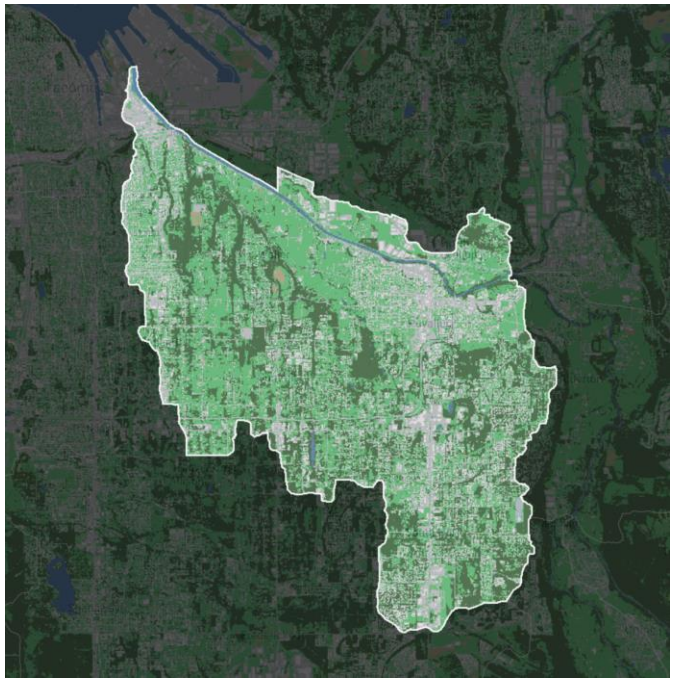
Results



Accuracy Results

- Imperviousness 98%
- Four Class Landcover 91%

Application



The Nature Conservancy

PAUL G. ALLEN FAMILY FOUNDATION

BOEING

Google

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TrashVision™

TrashVision™ Model

Deep Learning Mask R-CNN +

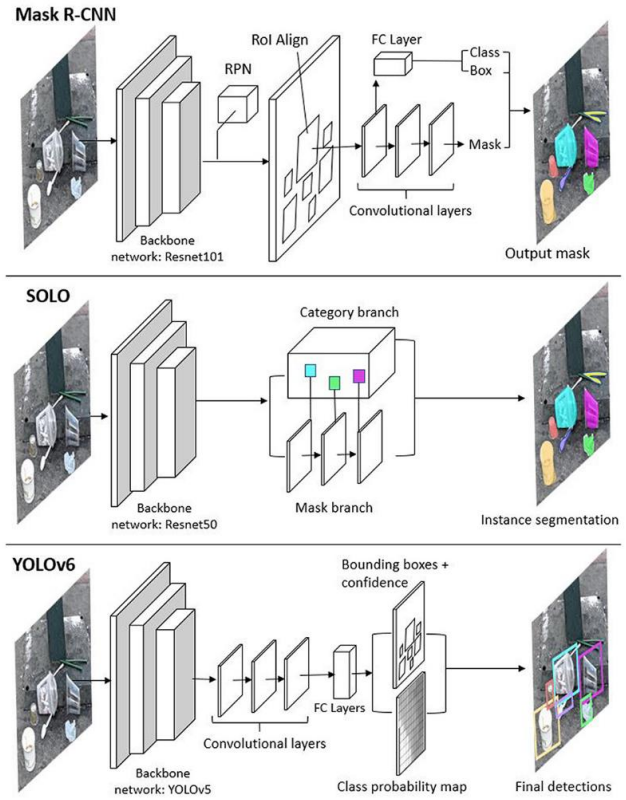

Fig. 3. Trash detection model schematics for Mask R-CNN (after He et al., 2017), SOLO (after Wang, Kong, et al., 2020, Wang, Zhang, et al., 2020), and YOLOv6 (after Redmon et al., 2016). Architecture components differ across models including backbone networks, convolutional layers, region proposal network (RPN), use of region of interest align (RoI), and construction of fully connected (FC) layers.

Inference Data

Vehicle Mounted Camera, GPS

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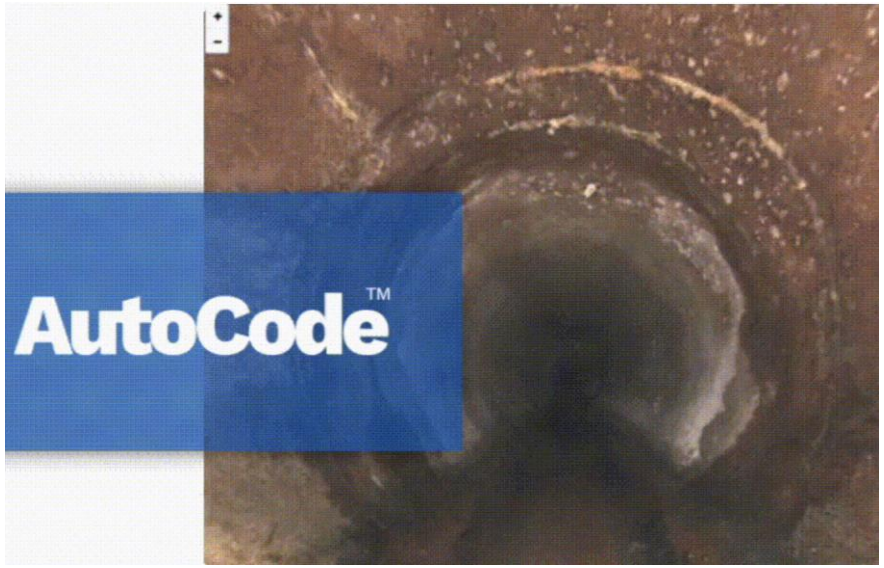
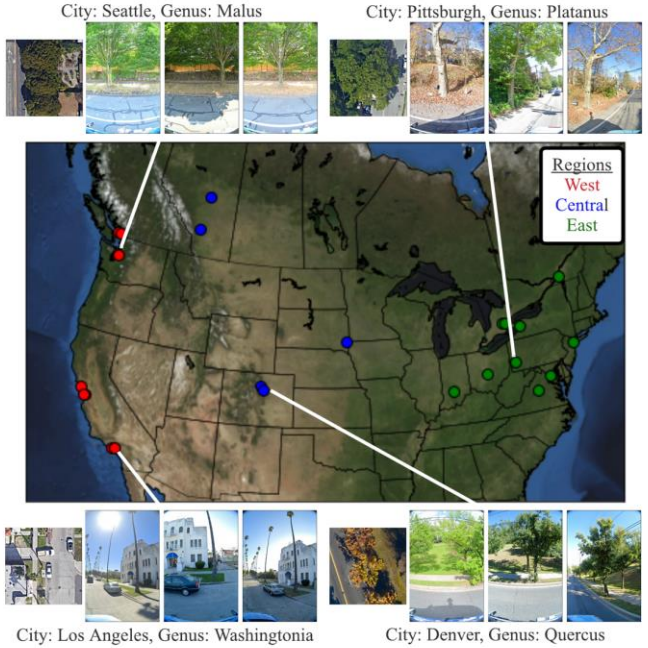
So Many More Opportunities!

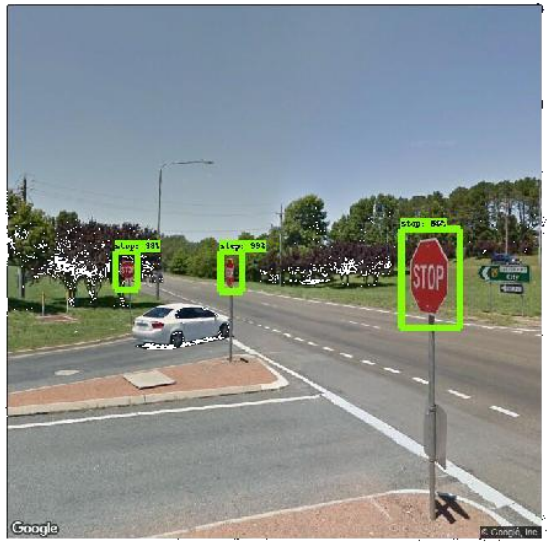
Condition Assessment



Tree Identification



Asset Inventories



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Brynjolfsson, Erik, and Tom Mitchell. "What can machine learning do? Workforce implications." *Science* 358, no. 6370 (2017): 1530-1534.

What tasks are not well suited for AI?

Work that requires long term planning

- Supervising projects
- Managing construction

Complex decision making that incorporates norms and values

- Work highly impacts the lives of others
- Justifying decision making processes

Work that needs to be perceived as coming from a human

- Stakeholder/customer interactions
- Negotiating
- Work that impacts policy or the public

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> If a problem is complex enough that we need AI to help solve it, then it is complex enough that AI alone can't solve it.

Michael Littman
Brown University
100-year AI Study Panel Chair

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