What are the limits of AI, and how to overcome them?

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What is the biggest limitation of deep learning?

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We need “small data” AI

Big data, small applicability

All possible applications of machine learning tool that require big data for training

Small data, big applicability

The universe of all possible applications of machine learning that can be trained using small amounts of data.

Plenty of need for small data learners

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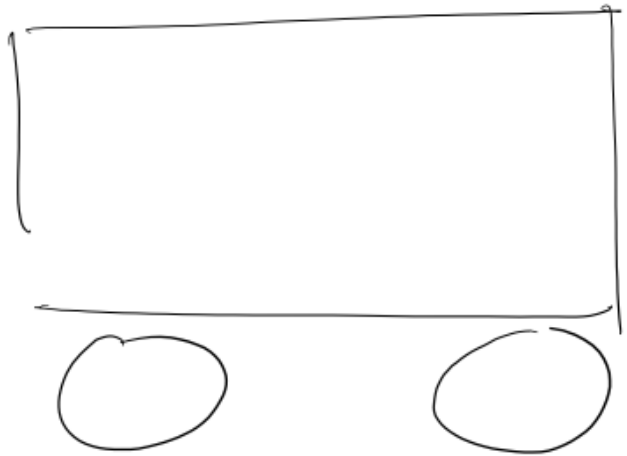
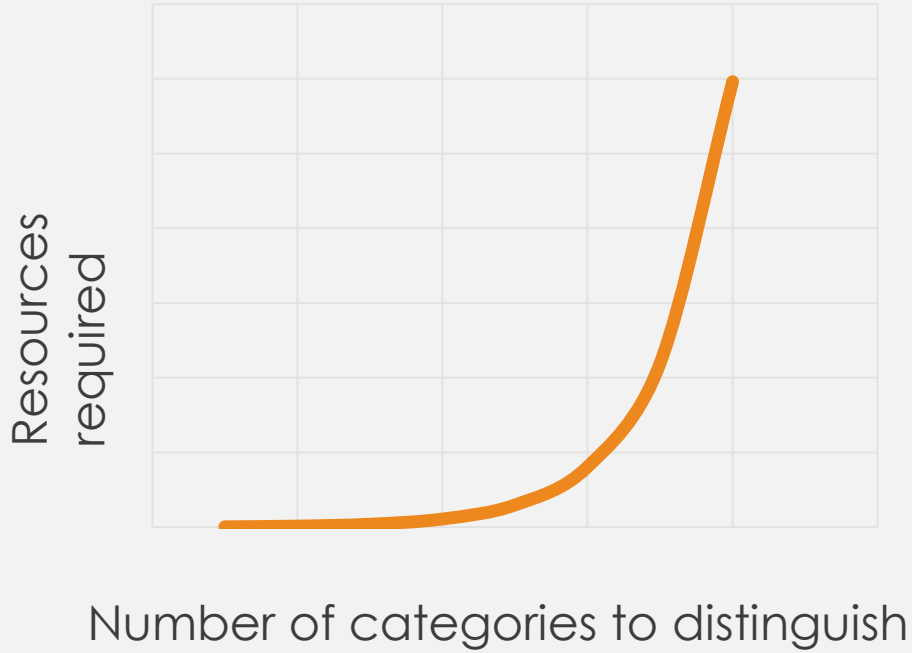


Intelligence of deep learning does not scale well

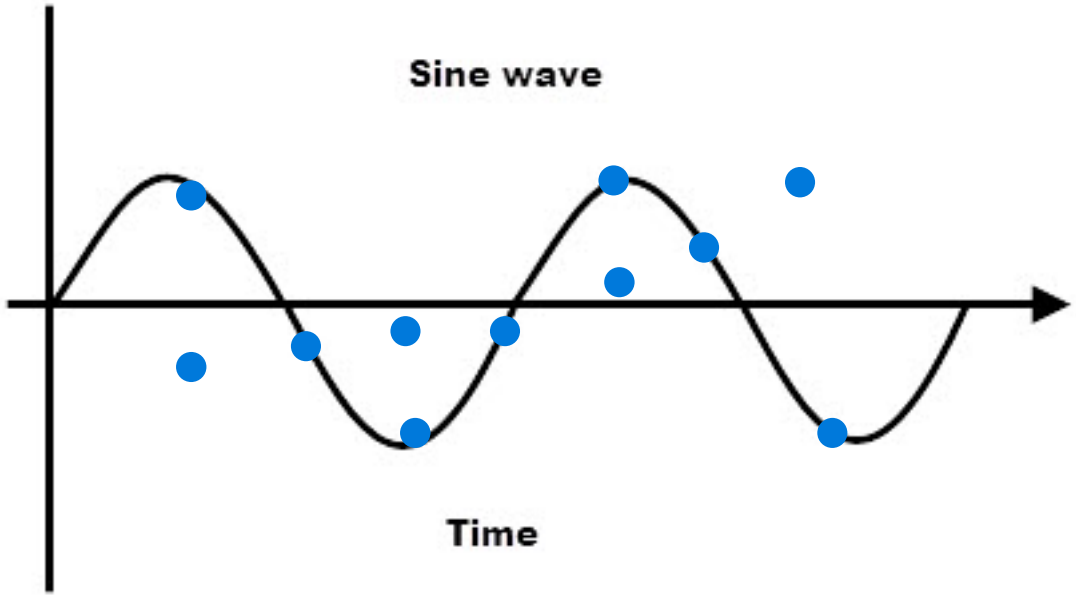


Where do limitations come from?

No free lunch theorem

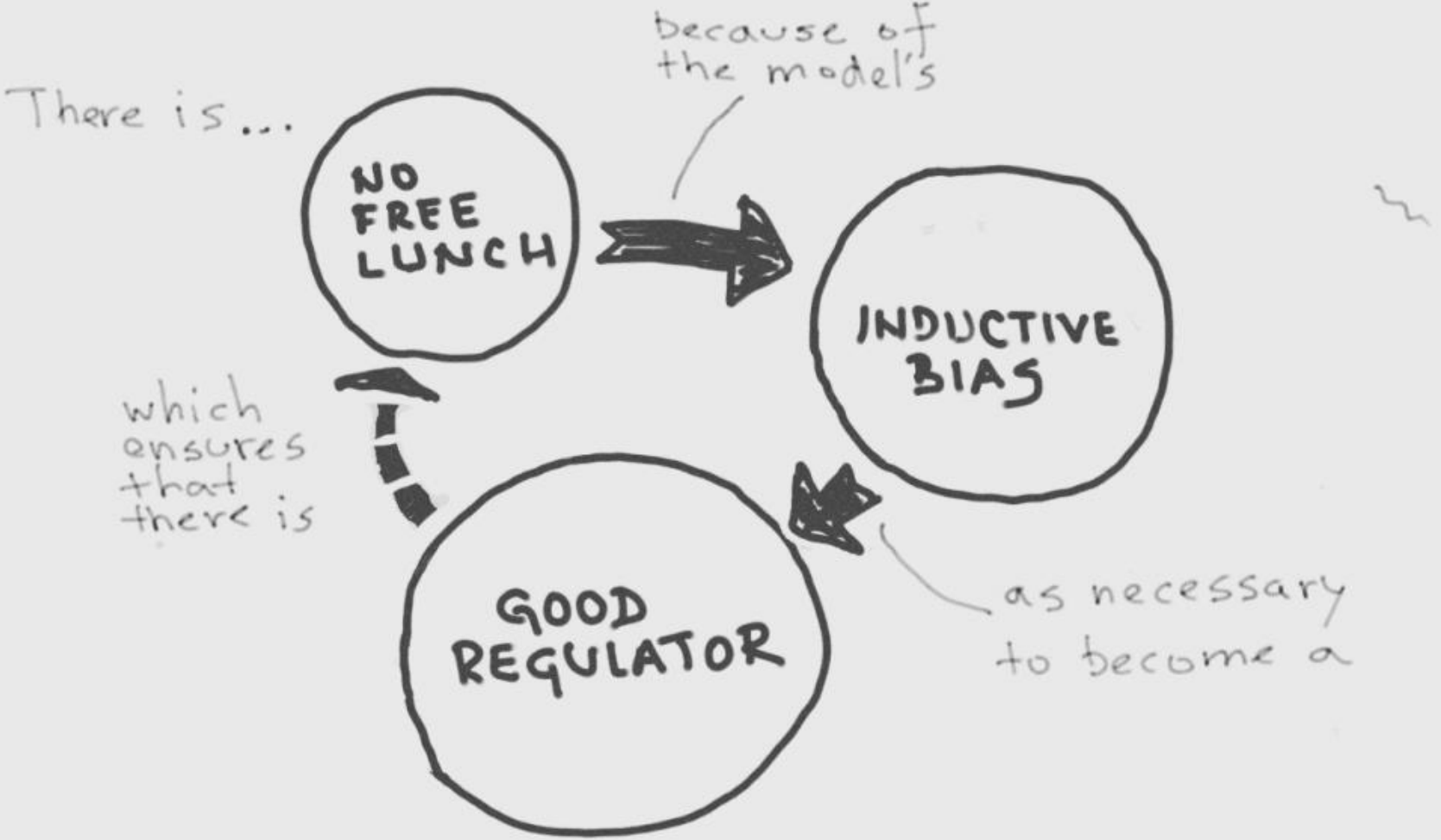
"Any two optimization algorithms are equivalent when their performance is averaged across all possible problems."

Inductive bias



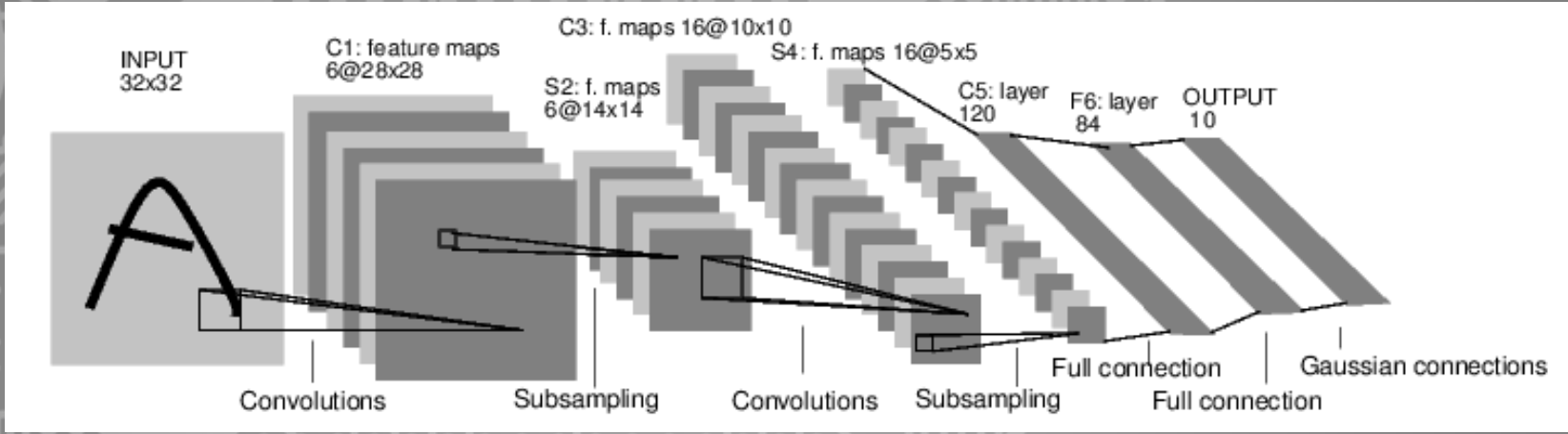
Good regulator theorem

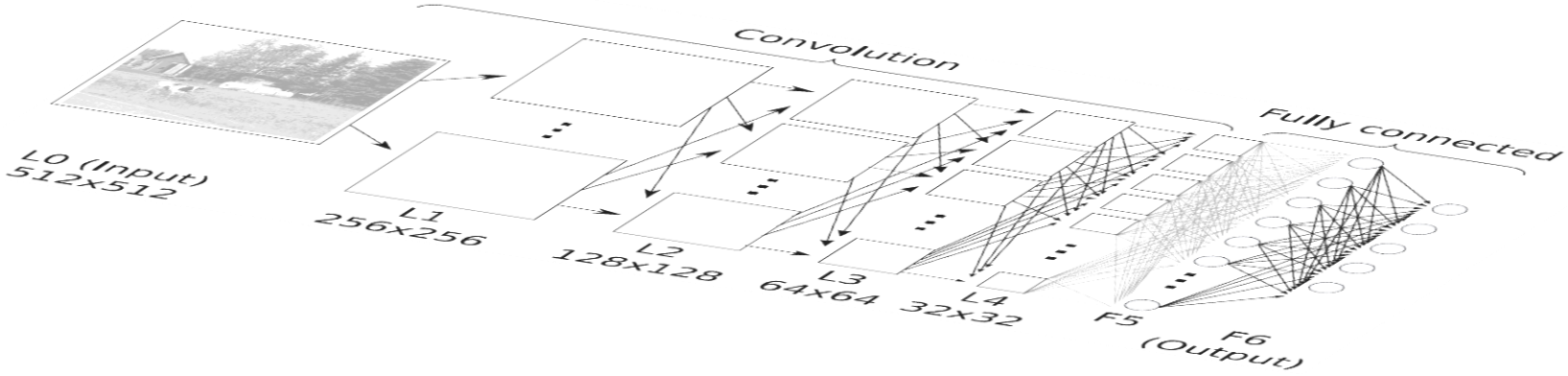
"Every good regulator of a system must be a model of that system."


There is...
NO FREE LUNCH
because of the model's
INDUCTIVE BIAS
which ensures that there is
GOOD REGULATOR
as necessary to become a

Overcoming limitations

Learn smarter




Convolution
Fully connected
L0 (Input)
512x512
L1
256x256
L2
128x128
L3
64x64
L4
32x32
F5
F6
(Output)

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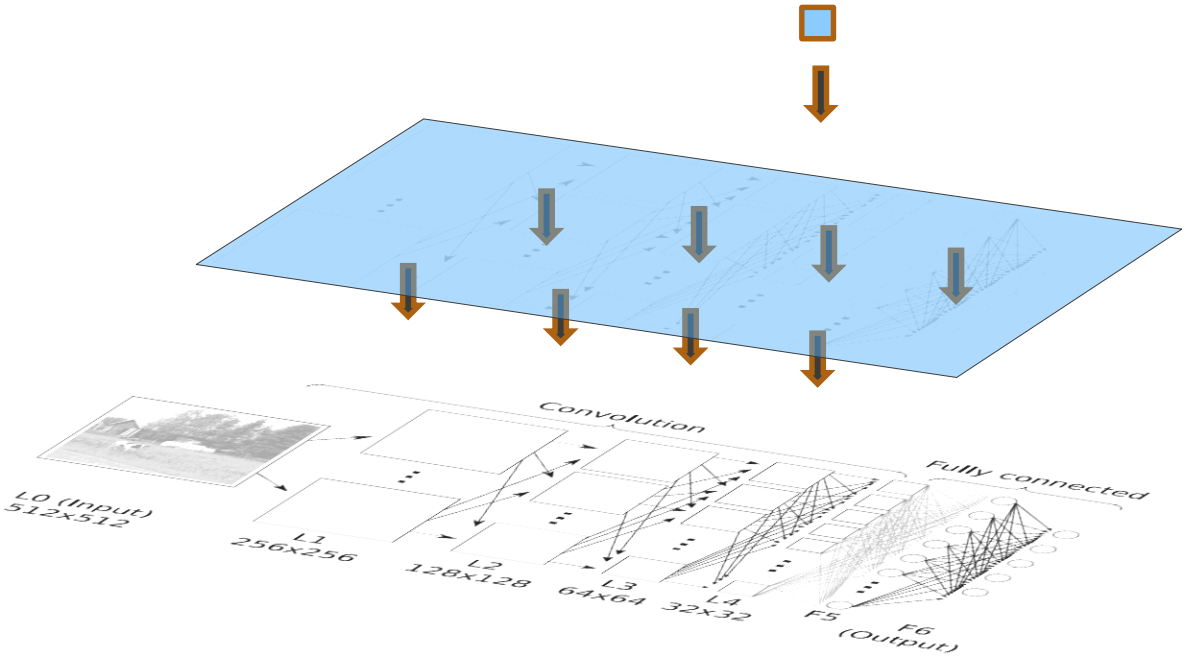

machine learning of machine learning

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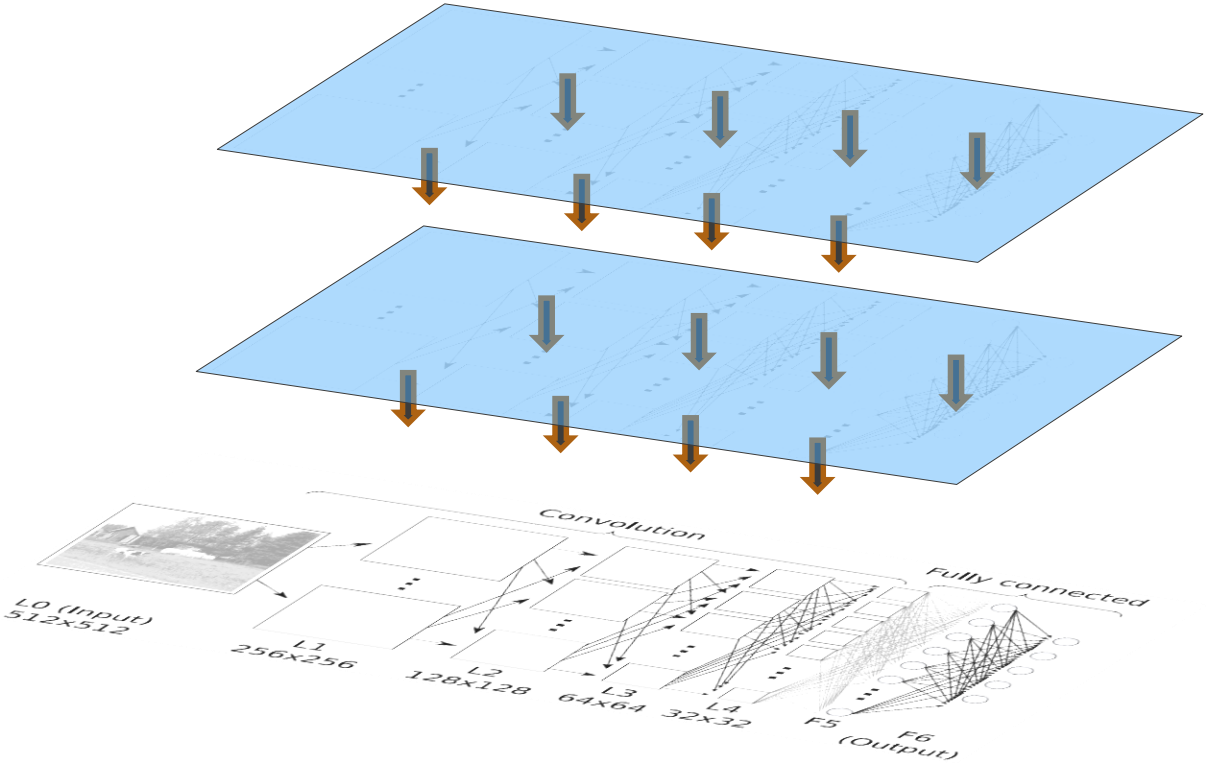
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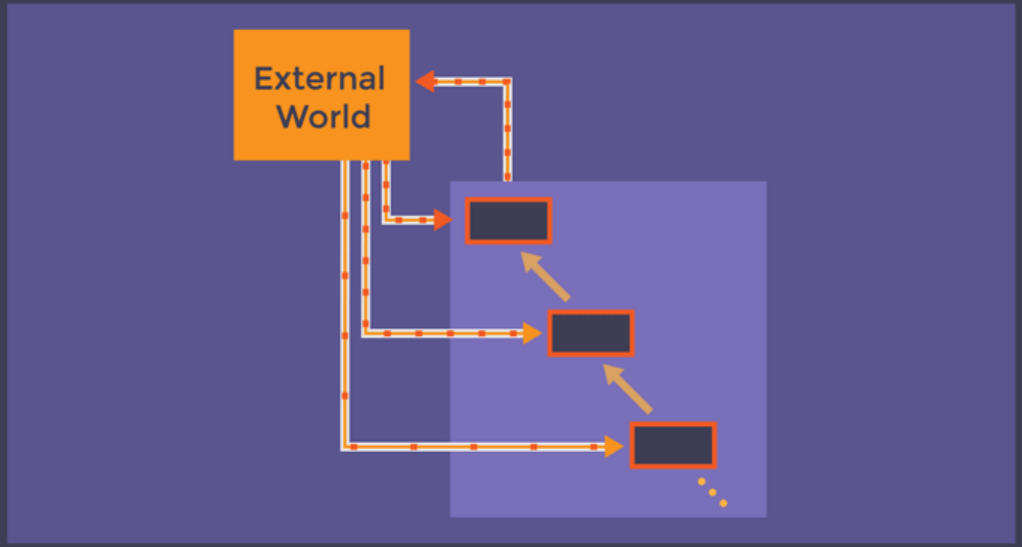
practpoietic cycle (loop) of causation



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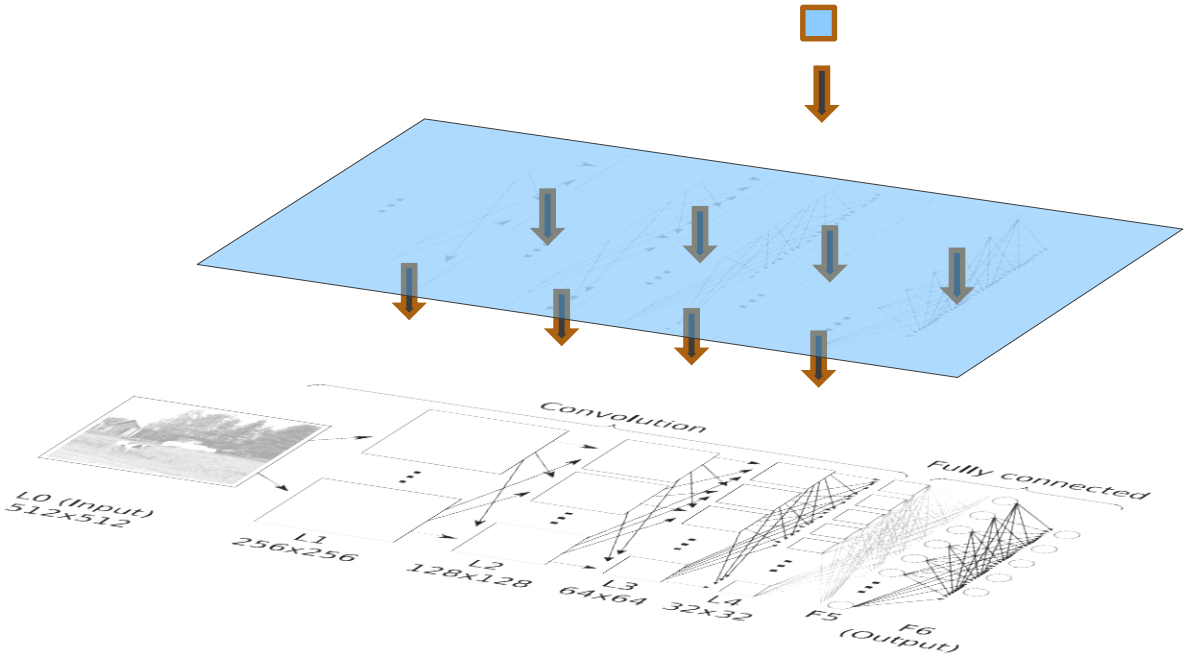
Specialized learner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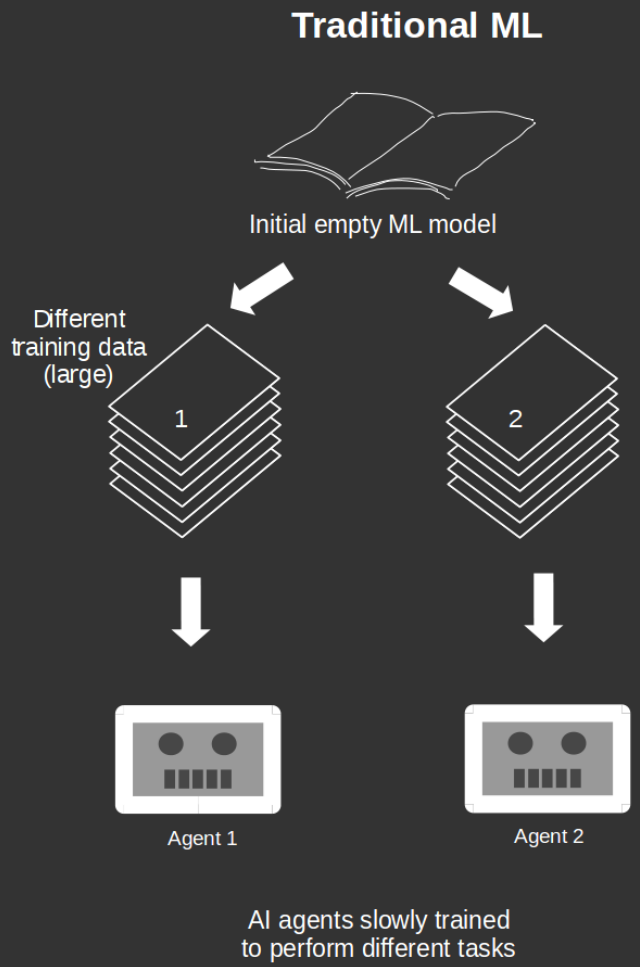
(Output)

So, how does it work?



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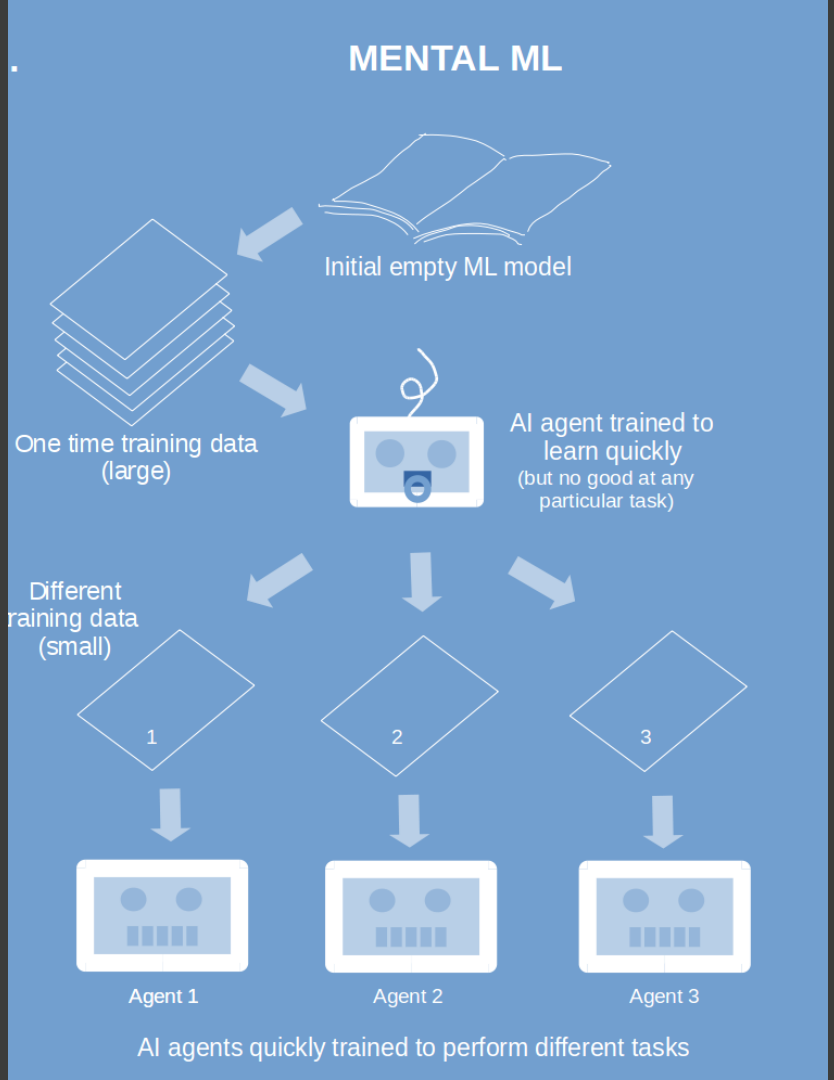
So, how does it work?



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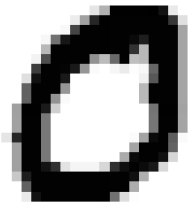
1. Training

2. Production



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#1

#2

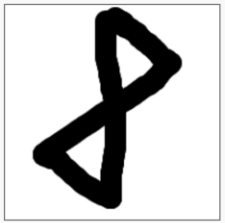
#3

SEND FOR TRAINING

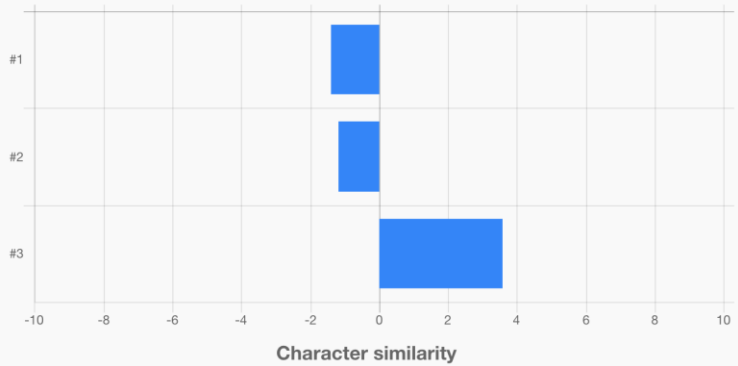
Mr. Character has been trained.

NOW YOU CAN MAKE A TEST.

Draw one of the characters.



SEND FOR TESTING



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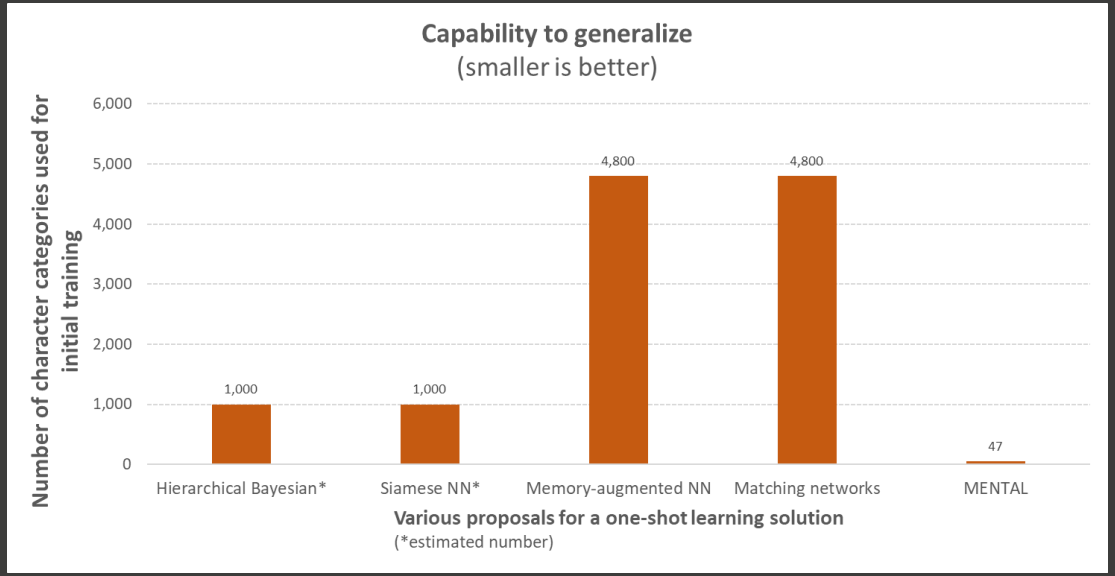
Perfected one-shot learning:

This technology beats everyone else's.



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Specialized learners

Summary

1. Wanted: deep learning on small data

2. Learning from small data is different.

3. It is possible only through specialized learners.

4. This is our future.

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