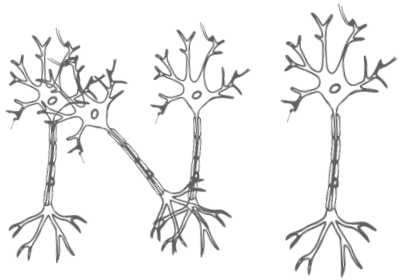
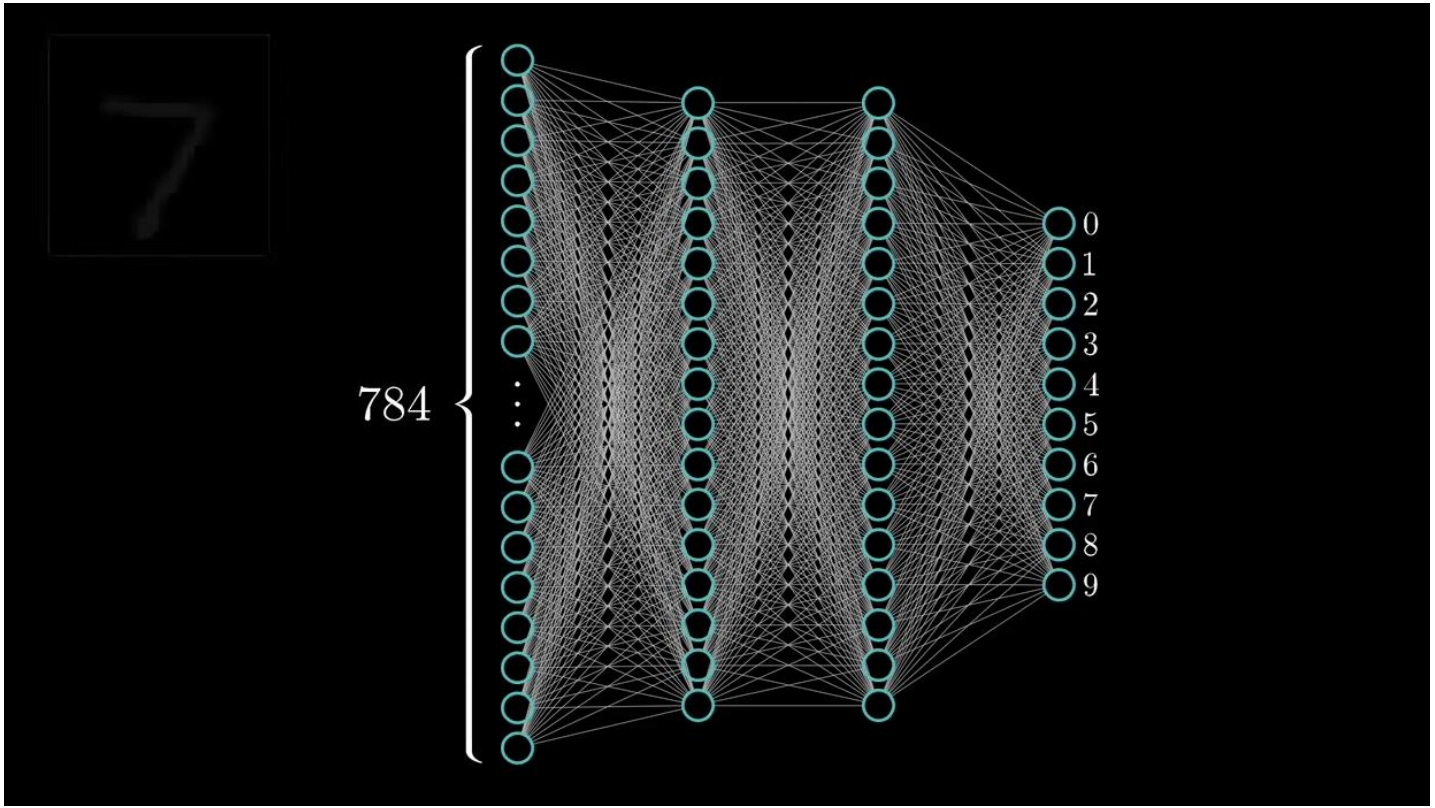
From natural to artificial intelligence

Jaan Aru

UNIVERSITY OF TARTU
Institute of Computer Science

Mission: Develop artificial intelligence by understanding natural intelligence




784
0
1
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9

Task with extensive training

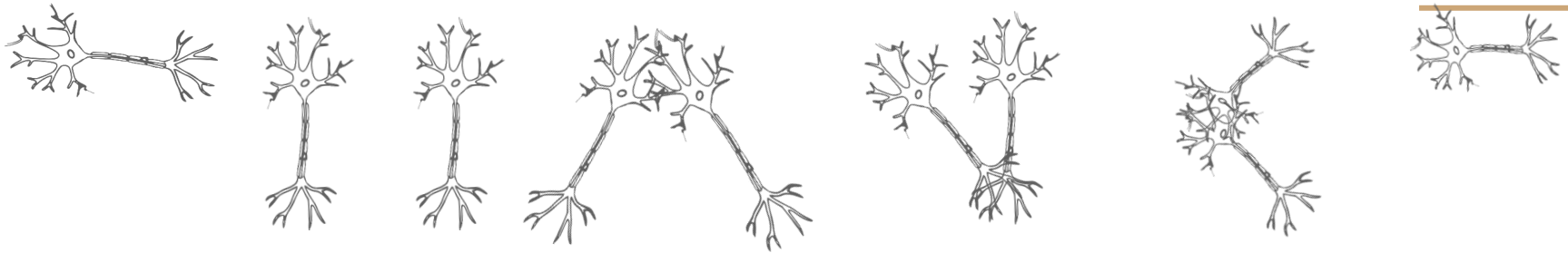
Task with extensive training ⇒ quick answer

Task with extensive training ⇒ quick answer

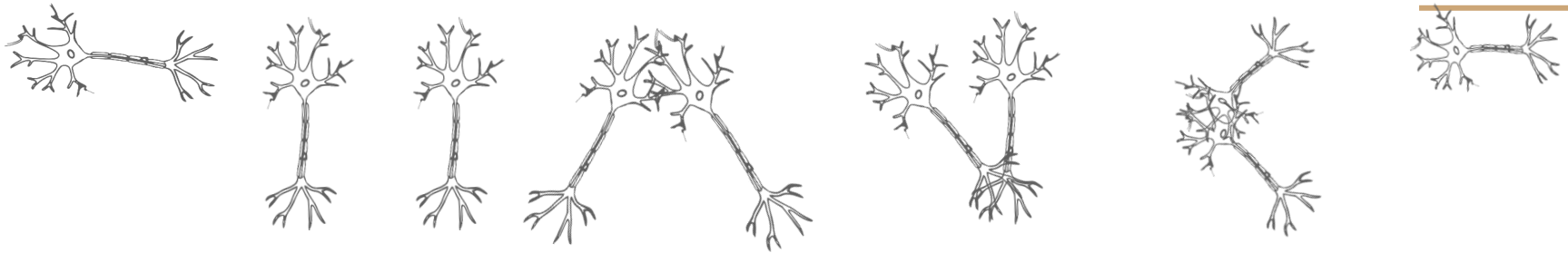
A novel task with no training

Task with extensive training ⇒ quick answer

A novel task with no training ⇒ search for an answer



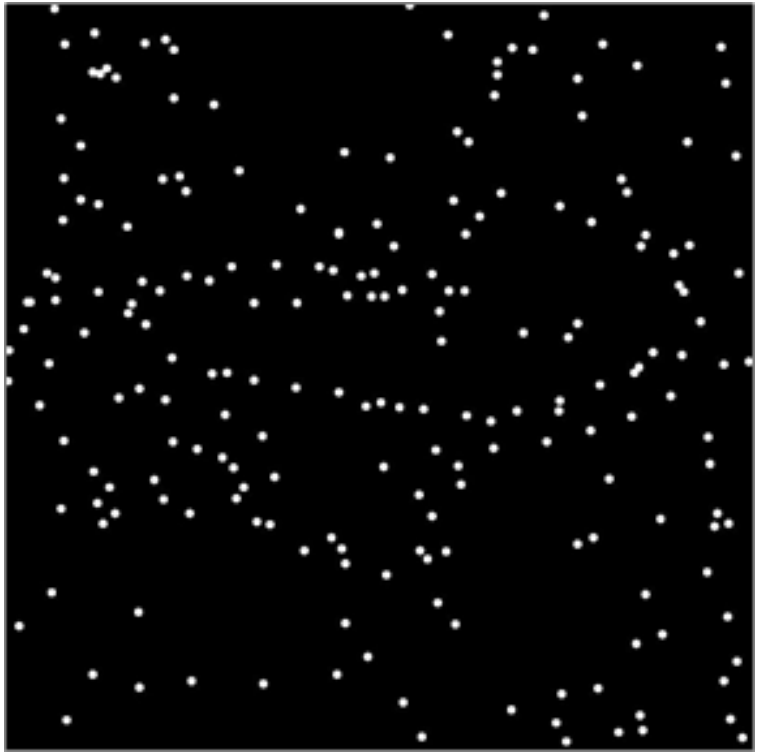
Given a novel task, our brain tries out (simulates) many ***possibilities***



Given a novel task, our brain tries out (simulates) many *possibilities*
and ***refines*** the solution over time

How can we develop AI algorithms that create **possibilities** and **refine** them?

Find the object embedded in dots!

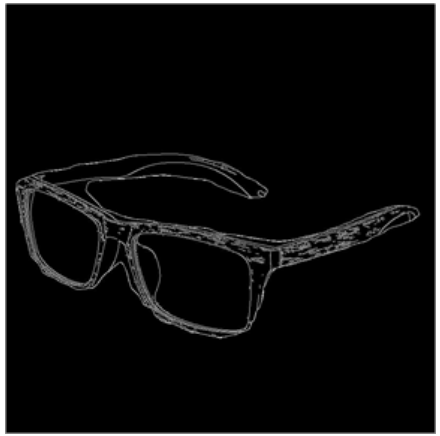


Making the stimuli

1. →

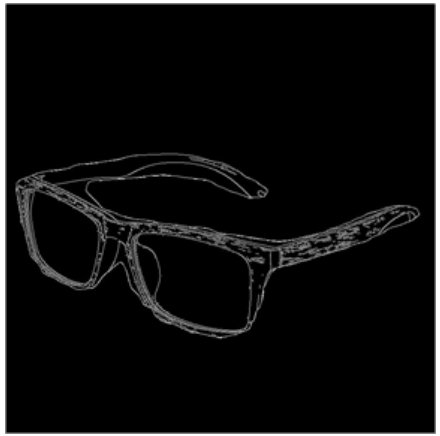
Making the stimuli

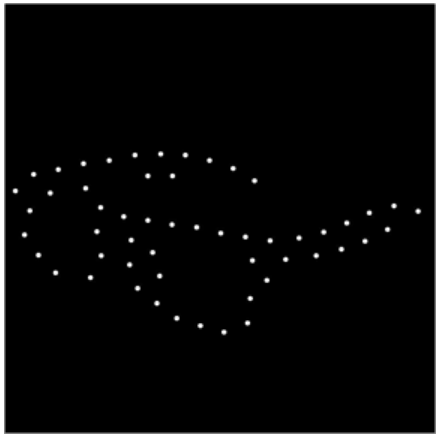
1. → 2. →



Making the stimuli

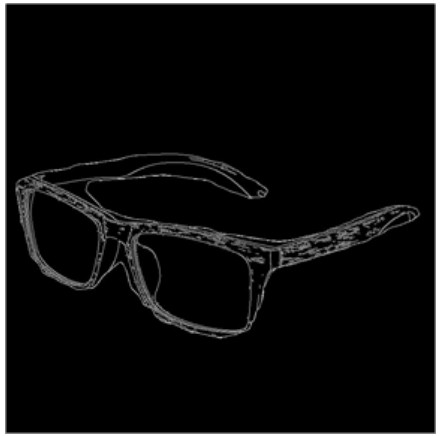
1. → 2. → 3. →

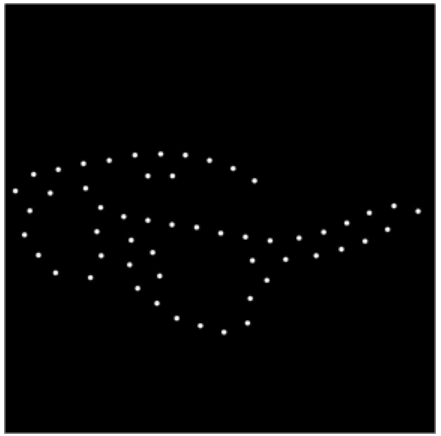


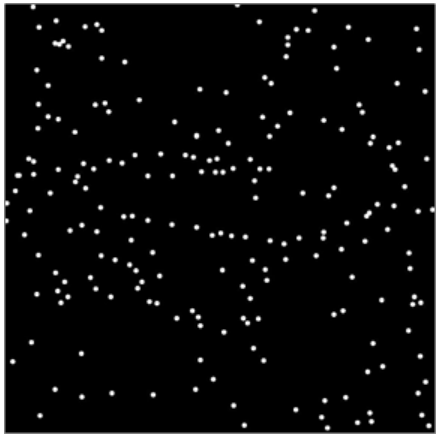


Making the stimuli

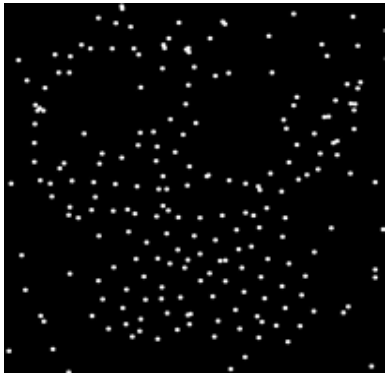
1. → 2. → 3. →







Simulation of *possibilities* and the *refinement* of a solution



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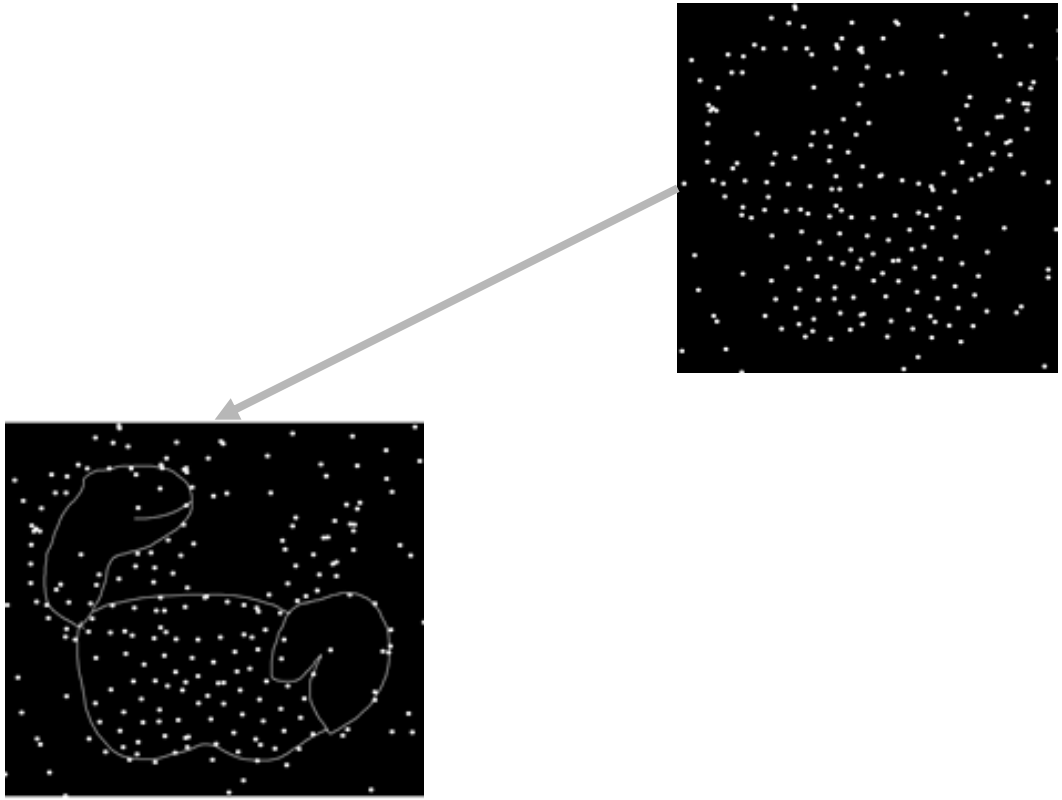

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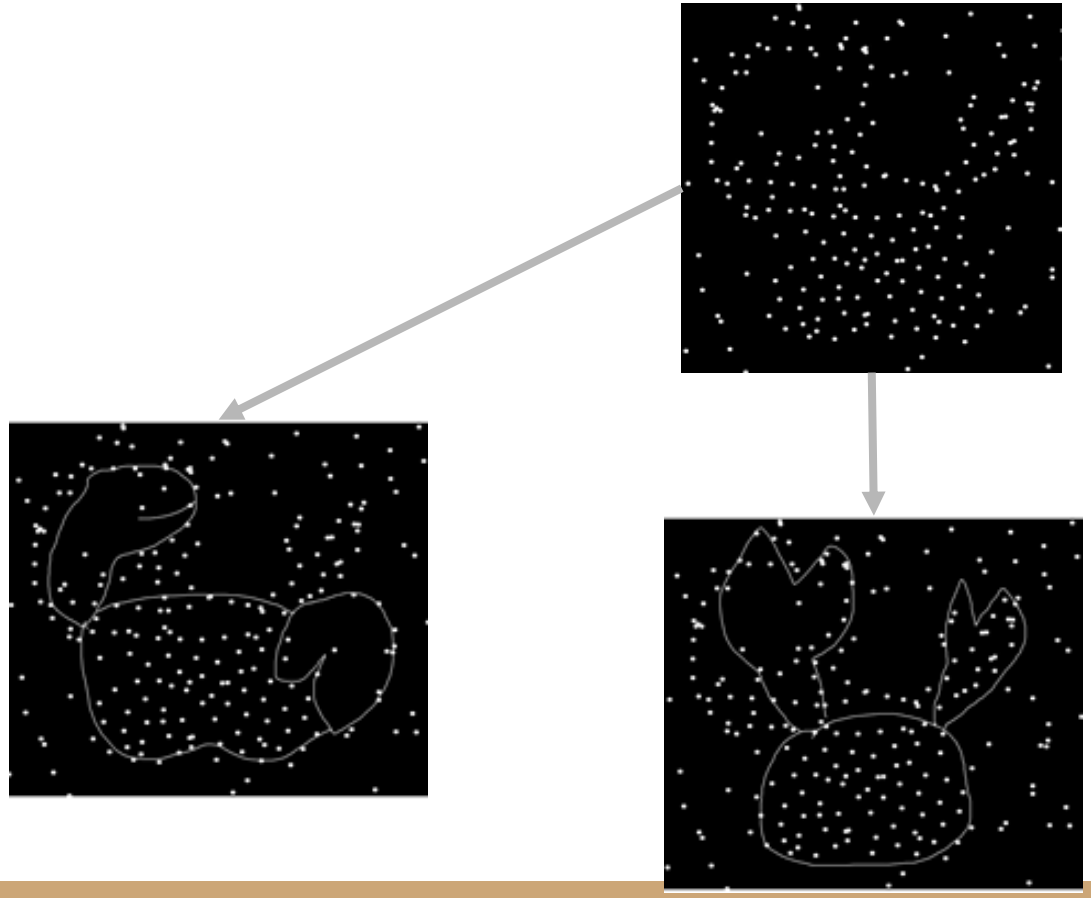

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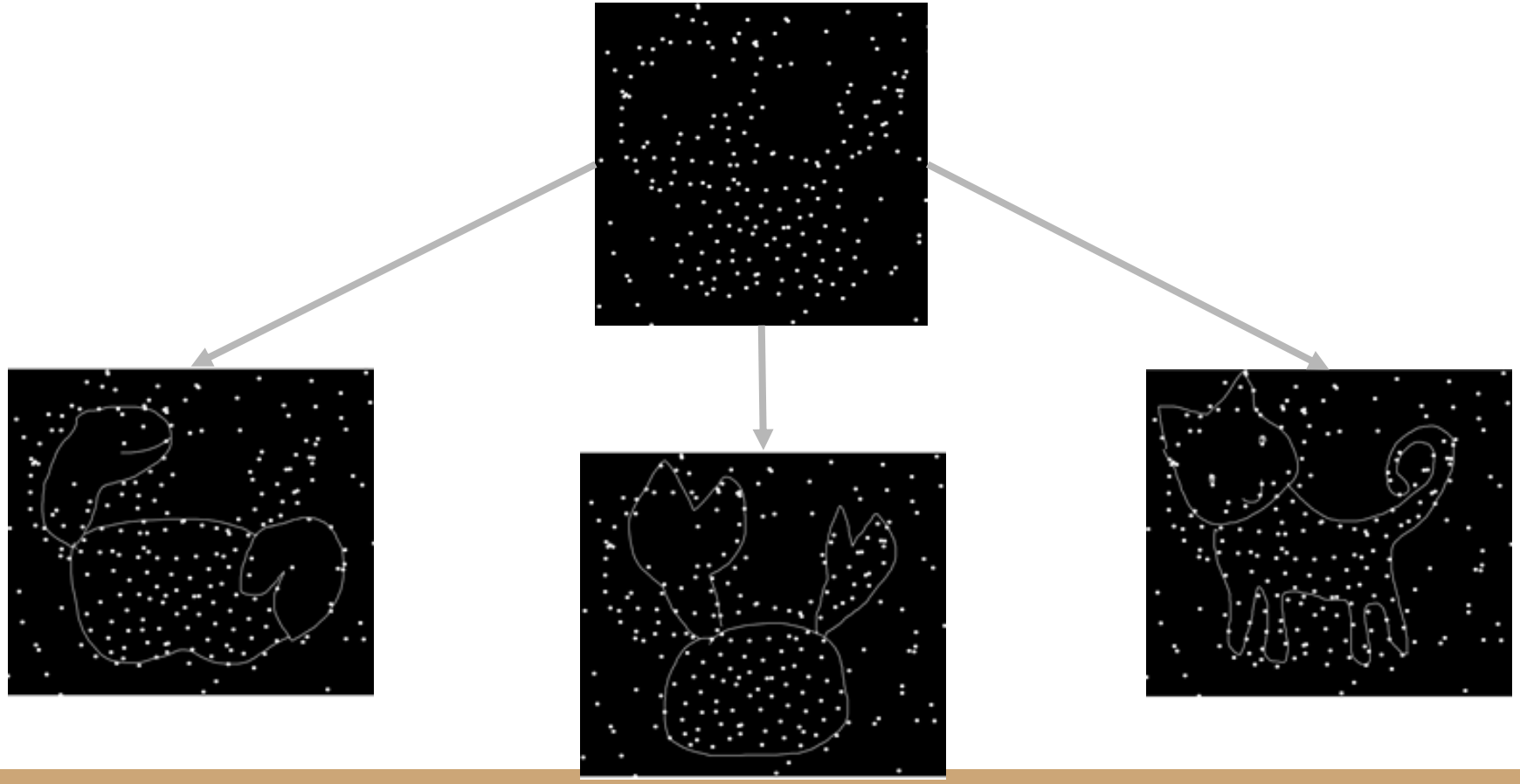


Taavi Luik

Tarun Khajuria

How can we develop AI systems that create many **possibilities** and **refine** them*?*

Constellation image

True sketch

Constellation image

True sketch

Constellation image

Genetic algorithm using CLIP

True sketch

Constellation image

Genetic algorithm using CLIP

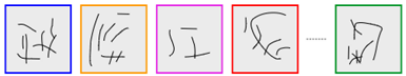
0. Heuristic initiation of 1000 sketches

True sketch

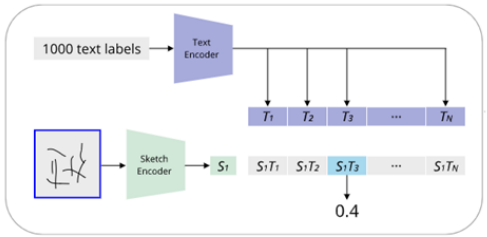
Constellation image

Genetic algorithm using CLIP

0. Heuristic initiation of 1000 sketches



1. Calculate similarity score for each sketch using CLIP



True sketch

Constellation image

Genetic algorithm using CLIP

0. Heuristic initiation of 1000 sketches

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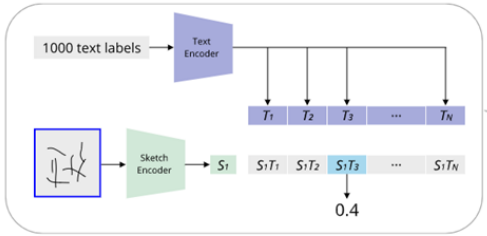

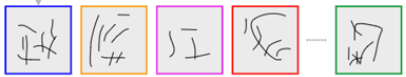

0.4 0.1 0.8 0.3 0.9

True sketch

Constellation image

Genetic algorithm using CLIP

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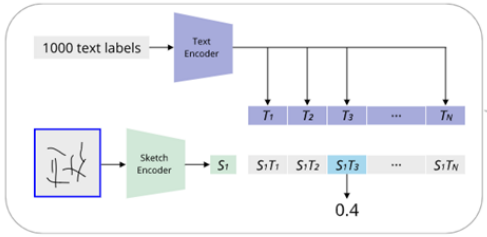

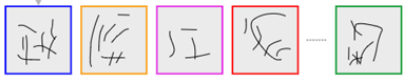

2. Choose top *k* sketches with the highest similarity score

True sketch

Constellation image

Genetic algorithm using CLIP

0. Heuristic initiation of 1000 sketches

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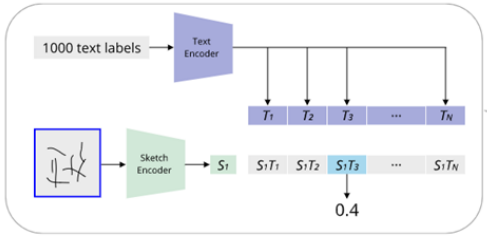
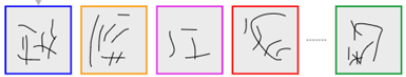




2. Choose top *k* sketches with the highest similarity score

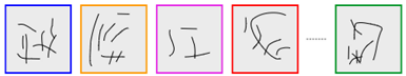
3. Create 1000 offsprings by adding or removing random lines

True sketch

Constellation image

Genetic algorithm using CLIP

0. Heuristic initiation of 1000 sketches



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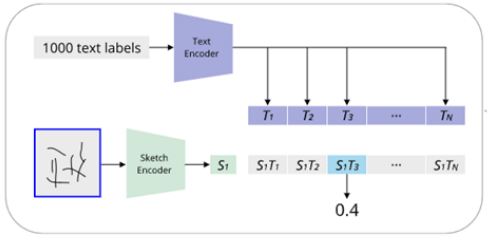
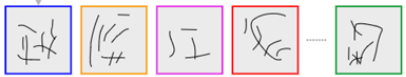


100 iterations



2. Choose top *k* sketches with the highest similarity score

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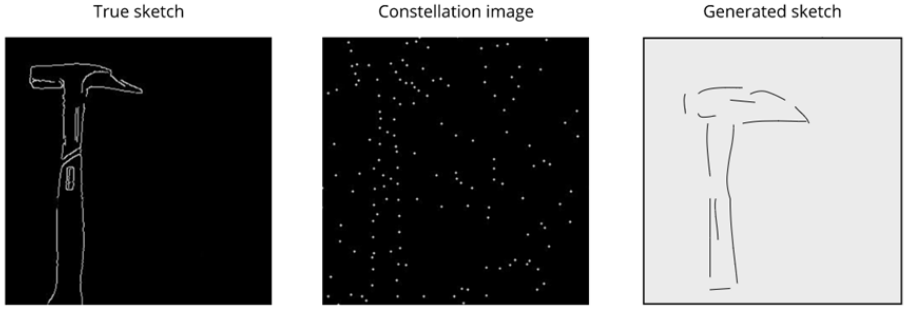
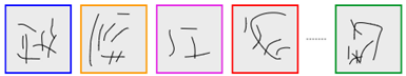


Genetic algorithm using CLIP

0. Heuristic initiation of 1000 sketches



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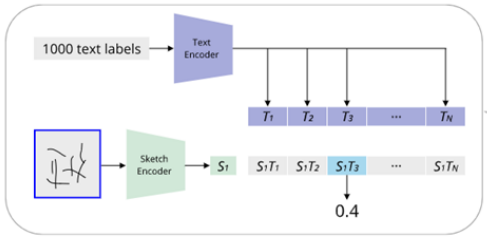
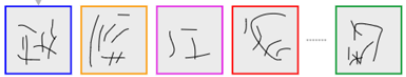


100 iterations



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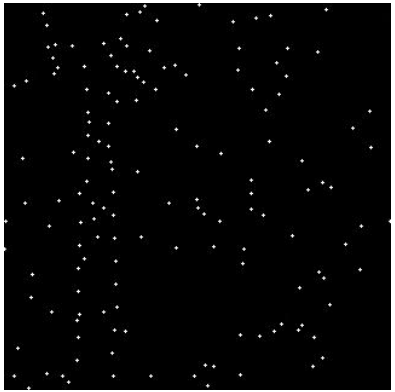
Simulation of *possibilities* and the *refinement* of a solution



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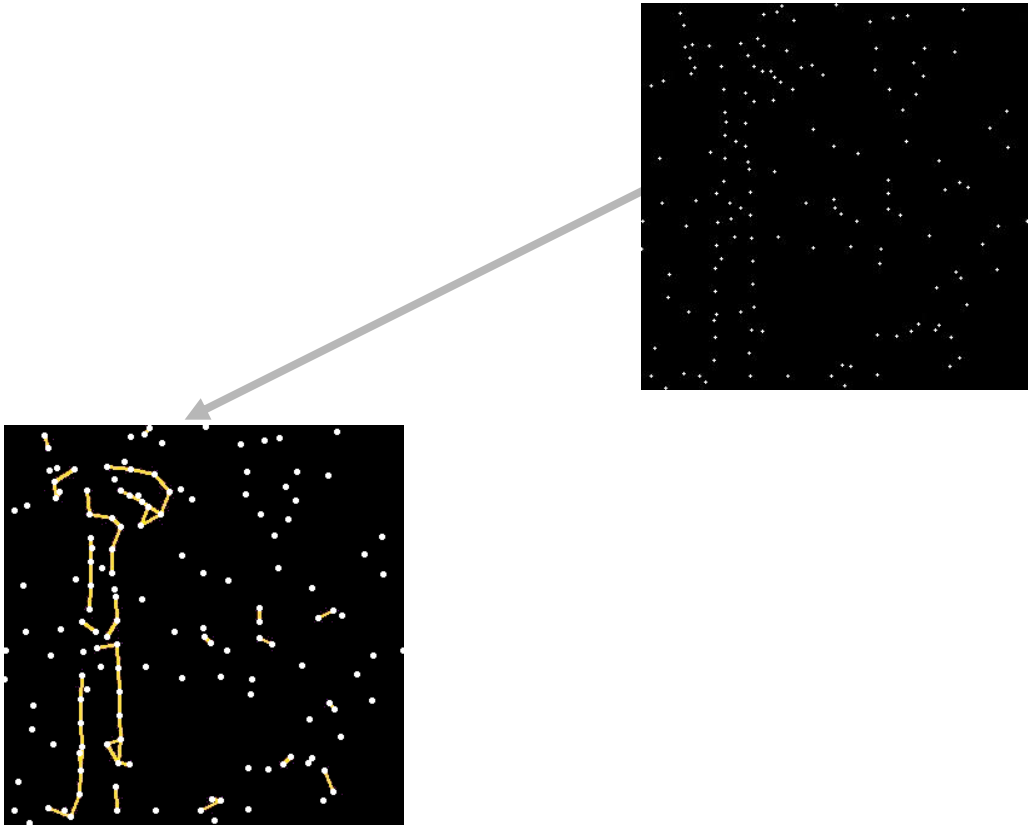

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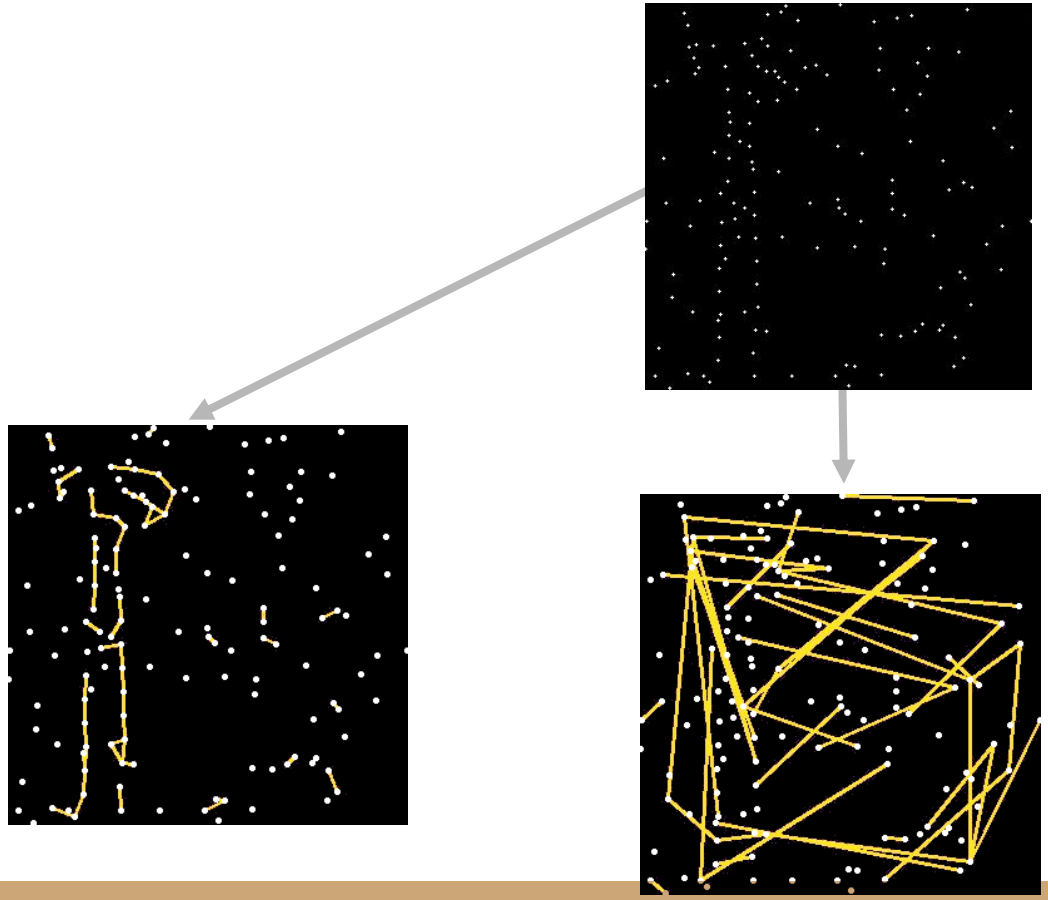

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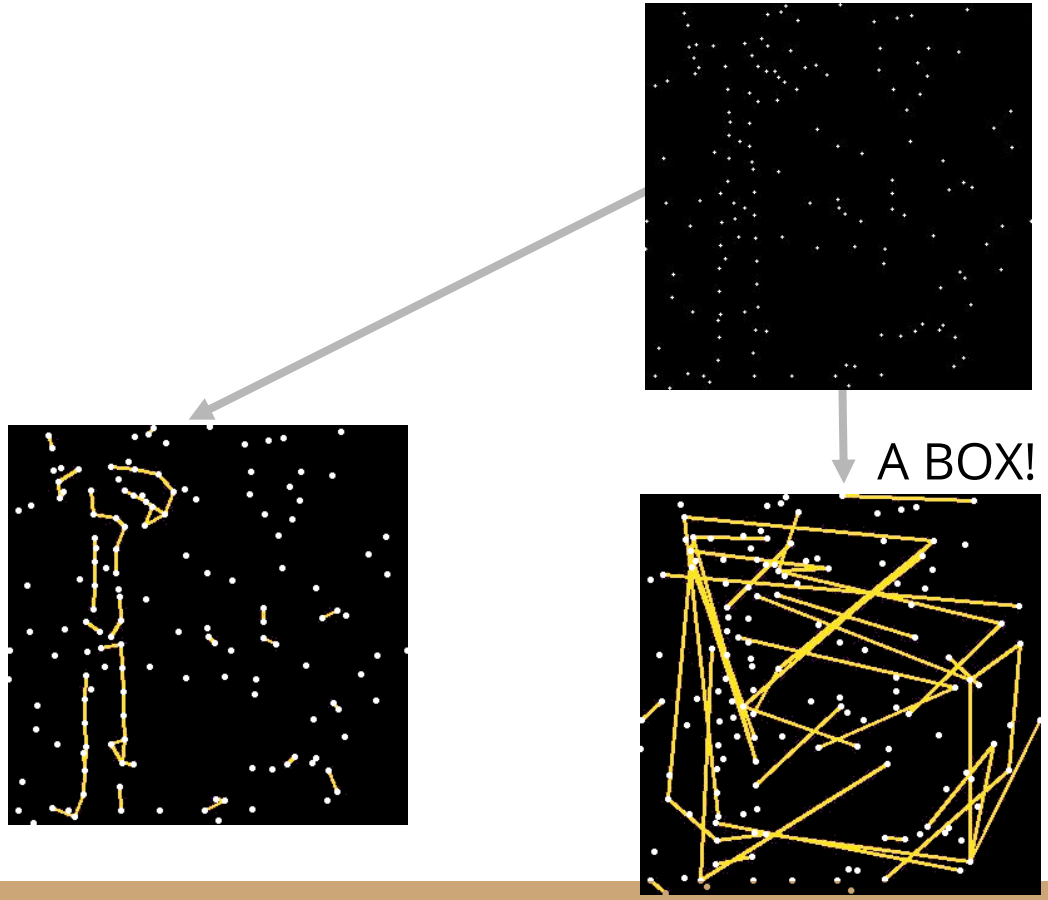

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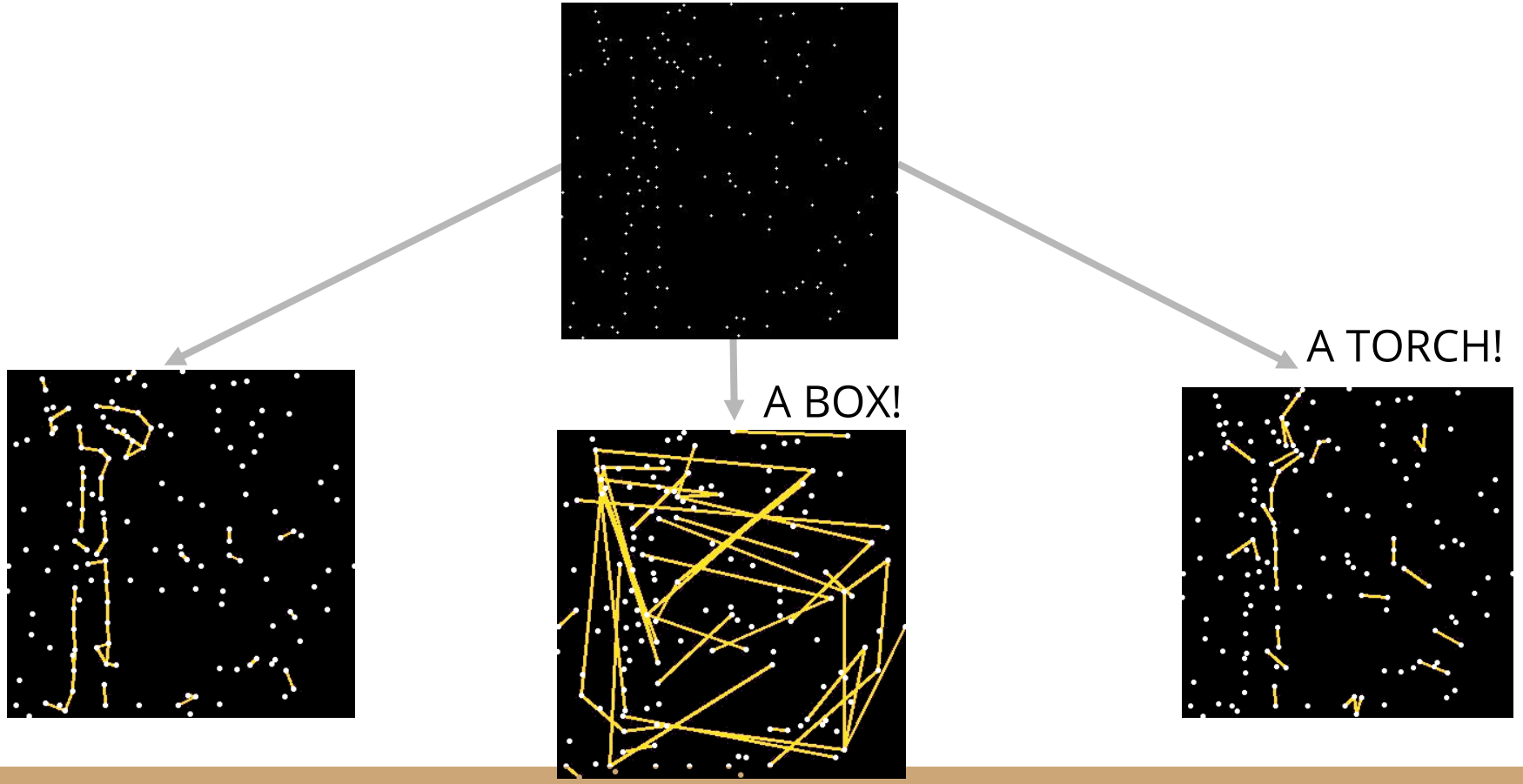
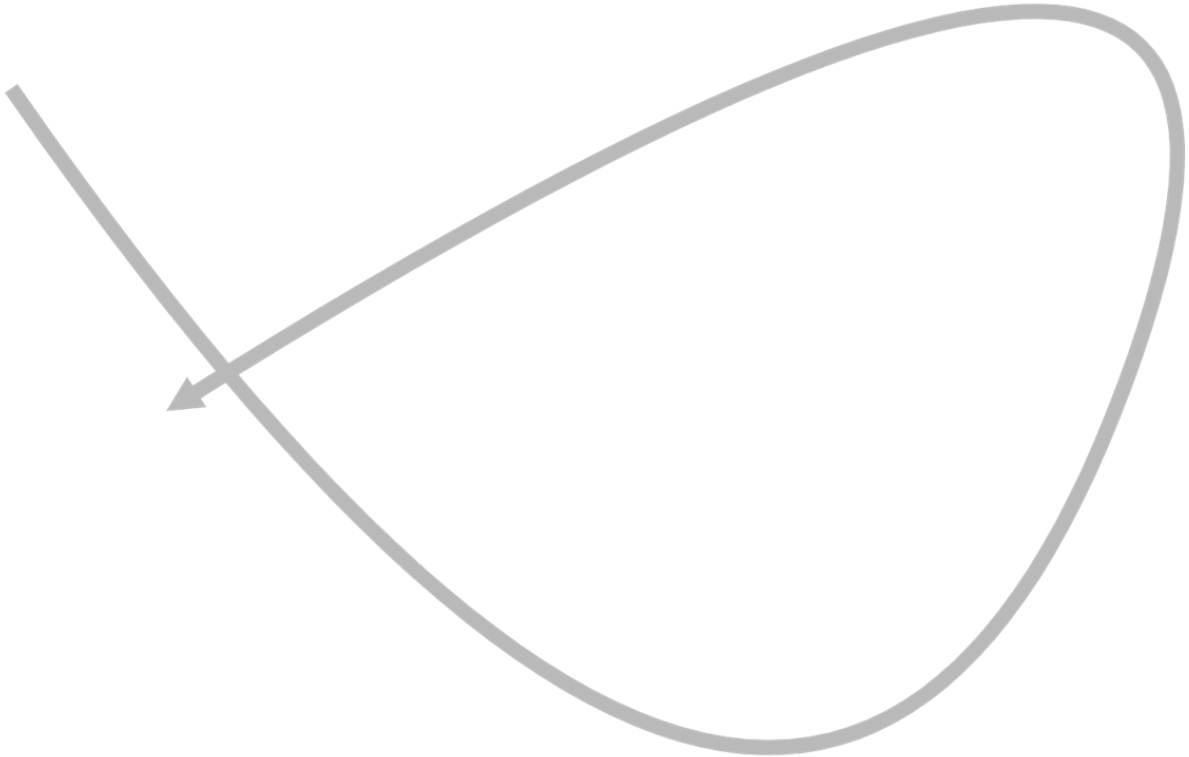
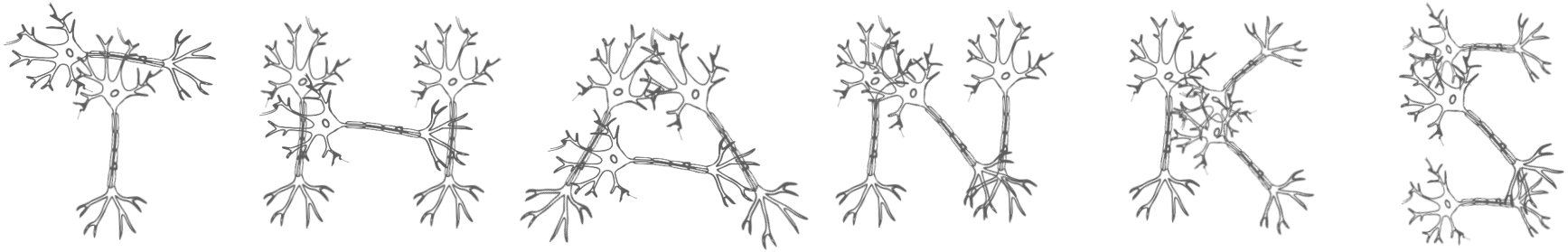


The Picasso mode

Today’s AI is too *narrow*

Today's AI is too *narrow* or too *wild*




THANKS