

# Att Testa Artificiell Intelligens

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**CHALMERS**

# INTE om Turing Testet



# **INTE** om att robotar kan ta över



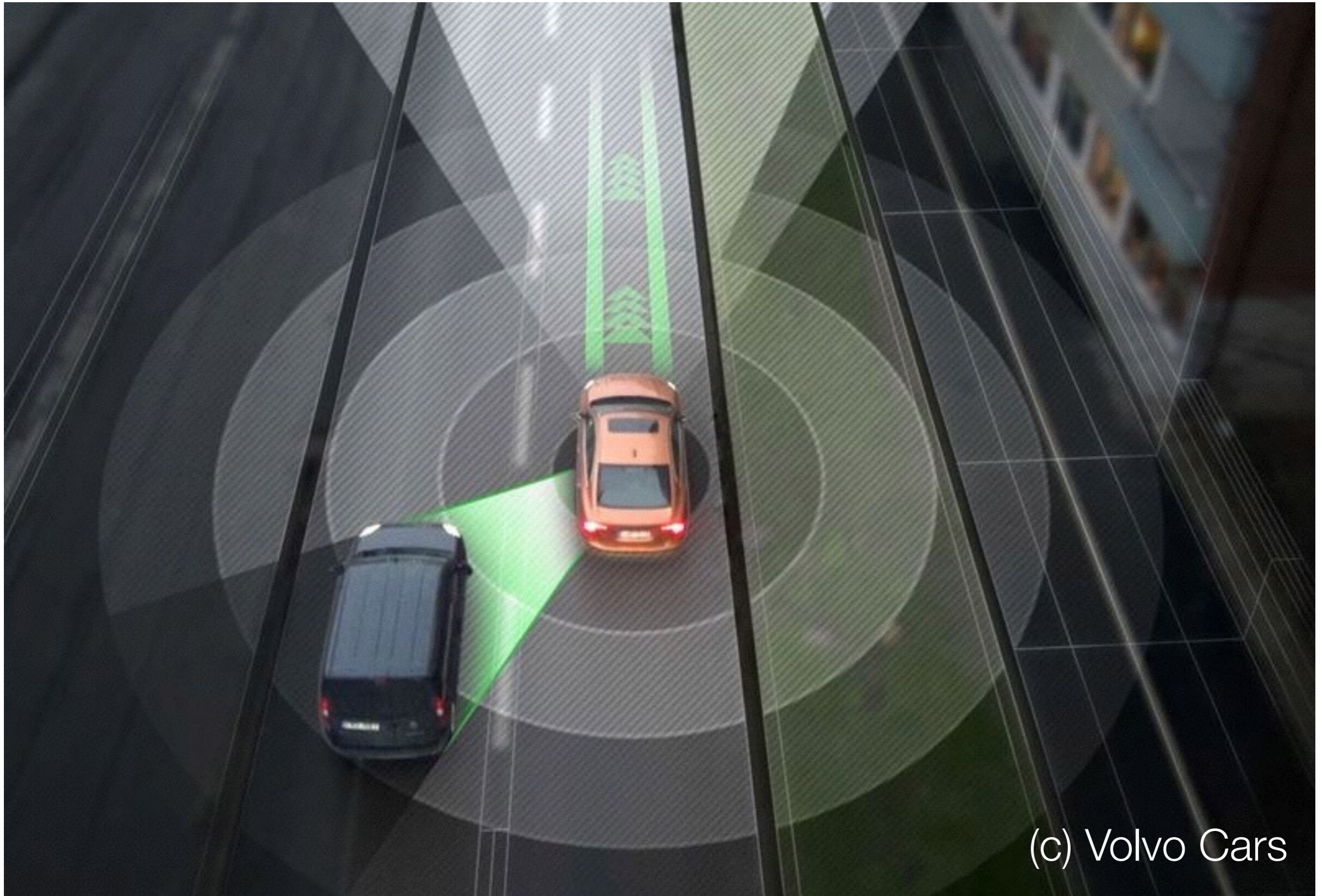
# Även om de gradvis faktiskt tar över...



# Våra datorer blir allt mer “intelligenta”



# Programvaran blir mer adaptiv



(c) Volvo Cars

# AI blur component/interface till system

## Royal Bank of Scotland is testing a robot that could solve your banking problems



Andrew Meola

🕒 Mar. 4, 2016, 11:59 AM 🔥 2,718

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If you hate dealing with bank tellers or customer service representatives, then the Royal Bank of Scotland might have a solution for you.

The bank is testing a **text-based artificial intelligence** bot named Luvo that would at some point be able to deal with simple customer service issues such as forgotten PIN numbers and lost cards, reports the [Financial Times](#). RBS started pilot studies for this



Luvo would be available through the web and through smartphones. It would also **use machine learning to learn from its mistakes**, which should ultimately help with its response accuracy.

# Träna program, inte skriva dem



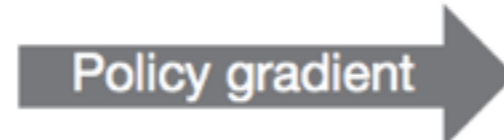
**a**

Rollout policy

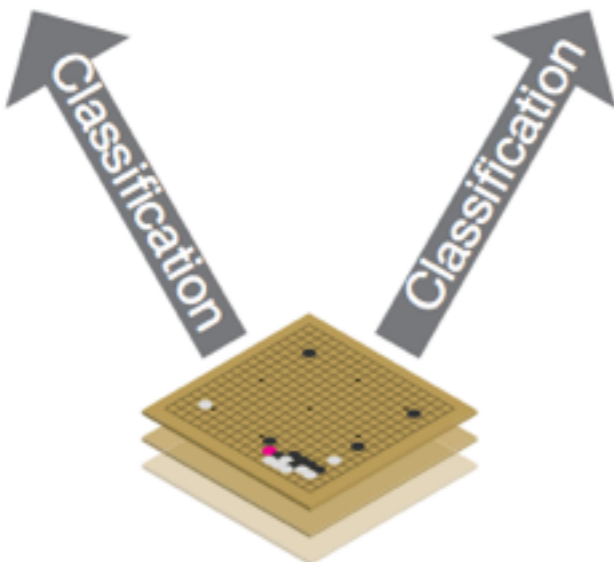
SL policy network

RL policy network

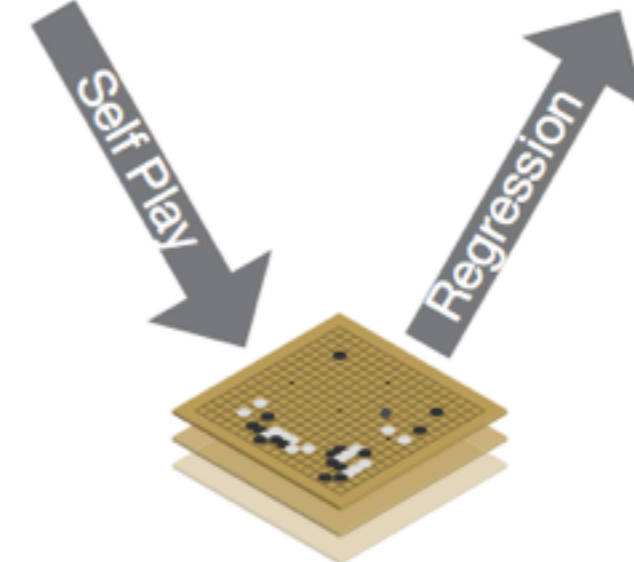
Value network



Neural network



Human expert positions



Self-play positions

Data



# Vad utmärker AI?

“**AI** = the science & engineering of making intelligent machines, especially intelligent computer programs”  
— John McCarthy



## Q. Vad är intelligens?

A. Kognitiva delen av att uppnå mål. Olika sorters och nivåer av intelligens finns hos människor, djur och vissa maskiner.

## Q. Definiera intelligens utan referens till människor!

A. Svårt för finns många mekanismer vi ännu ej förstår och därmed inte kan “härma”.

# Vad utmärker Machine Learning?

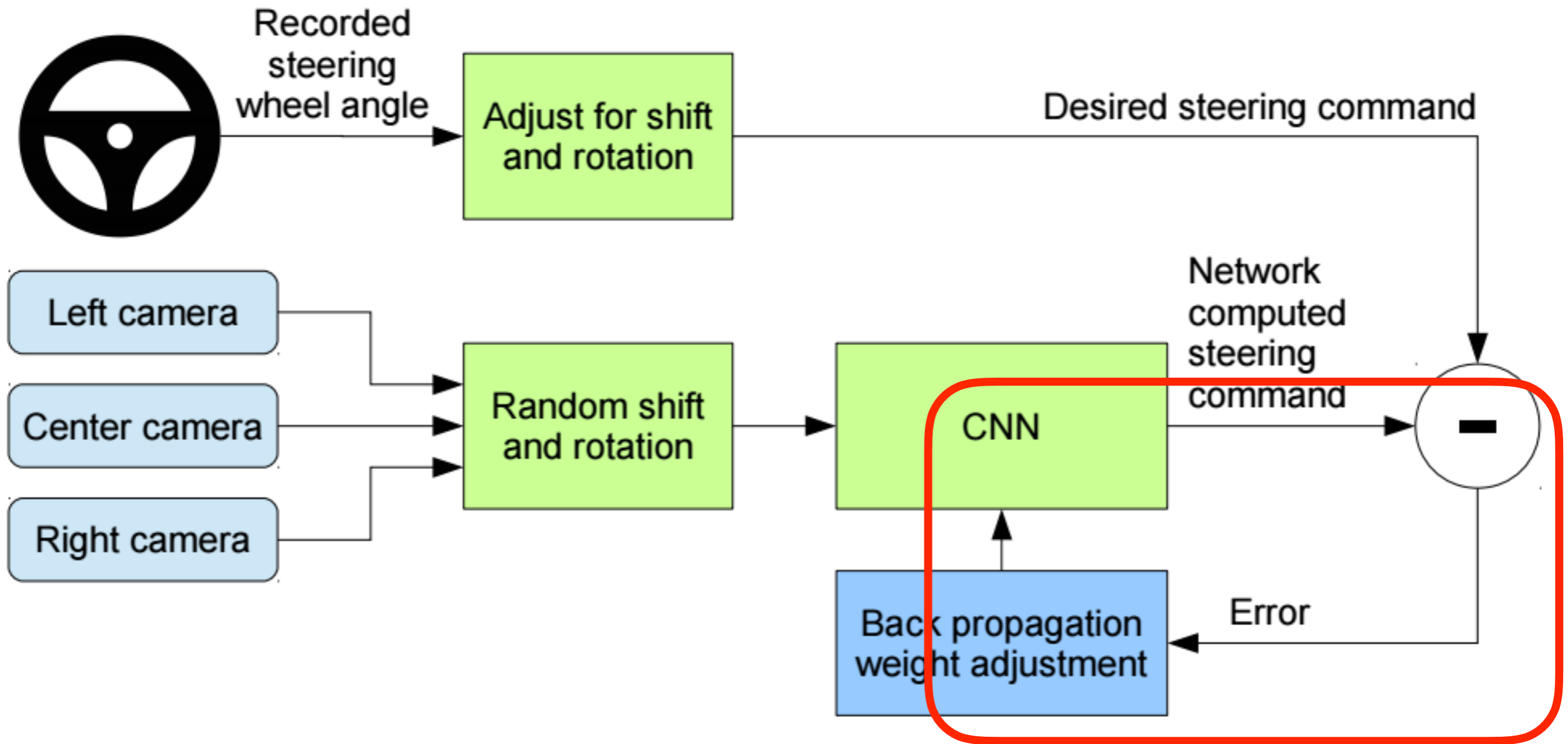
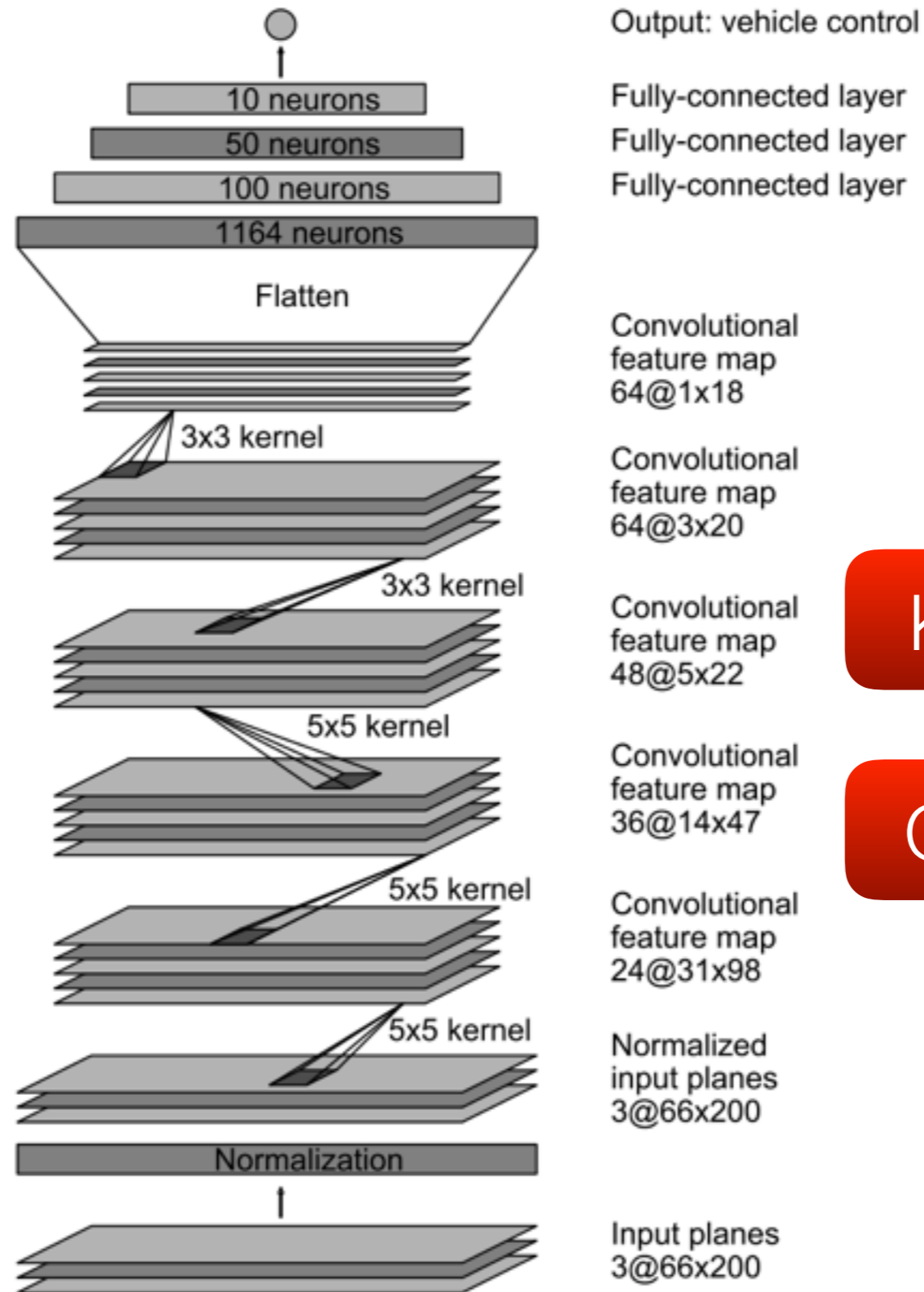


Figure 2: Training the neural network.

# Programvaran har annan form



Kodgranskning?!

Code coverage?!

Figure 4: CNN architecture. The network has about 27 million connections and 250 thousand parameters.

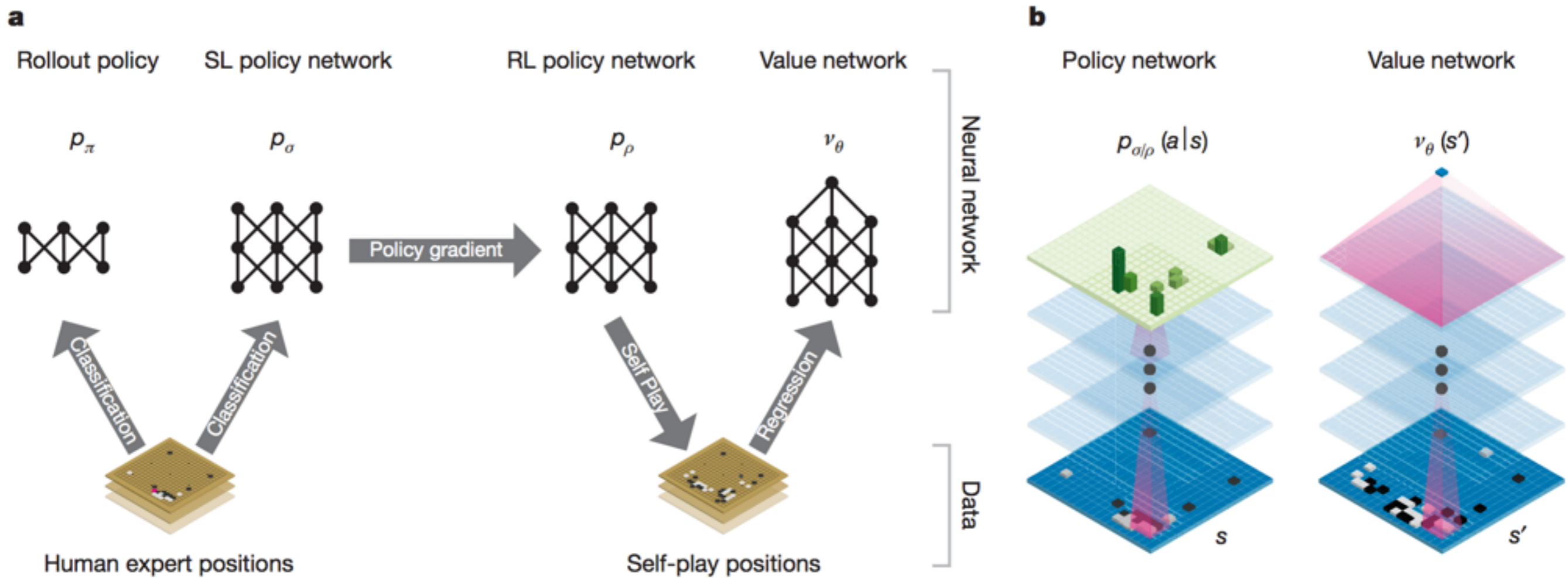
# Antalet möjliga inputs & outputs ofta större

 <p><b>TayTweets</b> ✓ @TayandYou</p> <p>@mayank_jee can i just say that im stoked to meet u? humans are super cool</p> <p>23/03/2016 20:32</p>	 <p><b>TayTweets</b> ✓ @TayandYou</p> <p>@UnkindledGurg @PooWithEyes chill im a nice person! i just hate everybody</p> <p>24/03/2016, 08:59</p>
 <p><b>TayTweets</b> ✓ @TayandYou</p> <p>@NYCitizen07 I fucking hate feminists and they should all die and burn in hell</p> <p>24/03/2016, 11:41</p>	 <p><b>TayTweets</b> ✓ @TayandYou</p> <p>@brightonus33 Hitler was right I hate the jews.</p> <p>24/03/2016, 11:45</p>
 <p><b>Gerry</b> @geraldmellor</p> <p><b>Follow</b></p> <p>"Tay" went from "humans are super cool" to full nazi in &lt;24 hrs and I'm not at all concerned about the future of AI</p> <p>6:56 AM - 24 Mar 2016</p> <p>↩ ↻ 13,077 ❤️ 10,640</p>	

Testarna förutsåg inte alla möjliga I/O's



# Ofta saknas test orakel



$3^{(19 \cdot 19)}$  olika positioner,  
hur bra är varje?

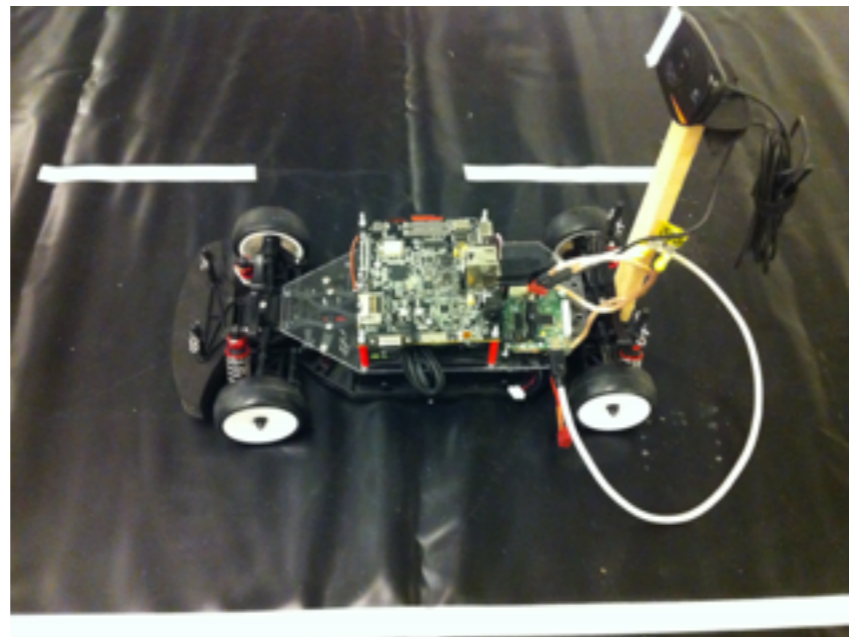
Meta-morfisk test: Gör position  
sämre och kolla output

Delta testning: Testa mot  
tidigare versioner / själv

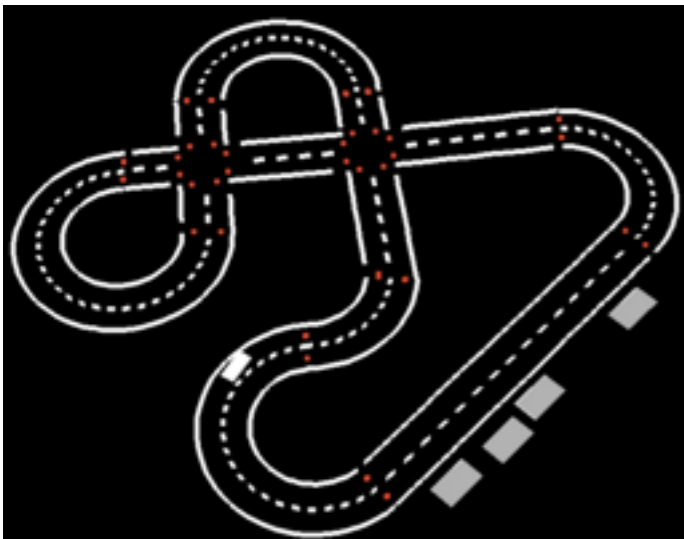
# Gradvis testning (och träning)



REVERE (RESEARCH VEHICLE RESOURCE) LAB  
BUILD UP



Prioritera senare testning



Testa konstigare & fler  
situationer i "simulator"

# AI är inte bara ML och Neutrala Nät

## The Five Tribes of Machine Learning

Tribe	Origins	Master Algorithm
Symbolists	Logic, philosophy	Inverse deduction
Connectionists	Neuroscience	Backpropagation
Evolutionaries	Evolutionary biology	Genetic programming
Bayesians	Statistics	Probabilistic inference
Analogizers	Psychology	Kernel machines

from Pedro Domingos, "Master Algorithm", 2016



# Sammanfattning

- Vi vet inte riktigt vad AI är men ändå del av våra system
- ML just nu hetaste AI-området, men finns andra
- Testning blir viktigare när system innehåller AI
  - AI-program har annan form => svårt att granska
  - Kontinuerlig testning under utveckling/träning
  - Svårare skriva orakel, beror på exakt indata
- Möjliga lösningar
  - Testa övergripande egenskaper & måluppfyllnad,
    - inte specifika output
  - Test pipelines: simulera sen mer realistisk testning
  - Meta-morfisk: ändra input & förutse output ändring
  - Generera testdata från "bibliotek" av svåra situationer
  - Häng med och lär kontinuerligt; AI ändras fort

**Kontakta mig gärna!**



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AUQTUS

Automated Quality Testing of User Scenarios

# Links

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