COGS 300 draw a maze. Detection 04 Oct 16/25

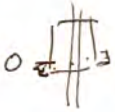
Intro
- circuits ⟶ a cognitive system needs a communication medium.
- estimation
  - cognitive systems approximate + manage error

Movement (embodiment, or basic mechanics)
- sensors
- actuators
- PWM (signal encoding)
- modalarity (servo)

} a cognitive system needs to sense to act

Control (interaction w/ environment) ~ a cognitive system needs to filter noise and adjust
- measurement (encoders)
- long-distance sensing + signal noise (filter)
- self-adjusting (PID)
- prediction (probability 101)

Detection (modelling) ~ a cognitive system needs to model the world.
- conditional probability (modeling, bayes)
- repeated measurements (Bayes Filter)
- inference (Bayes nets)
- classification (today).



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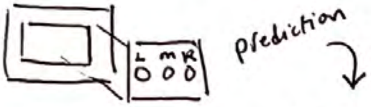
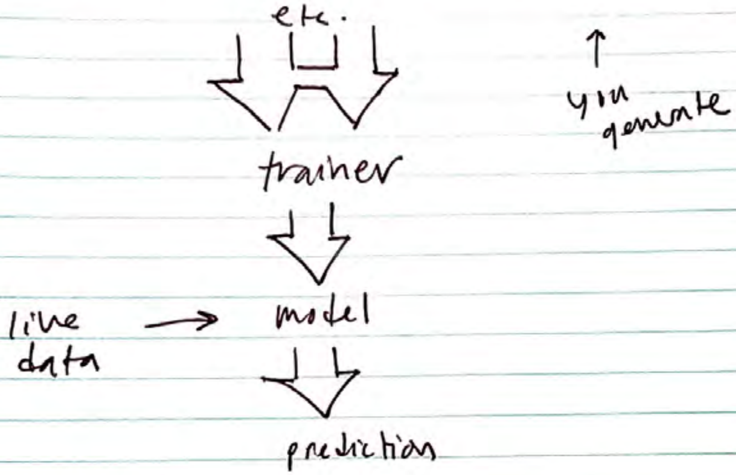
☆ cases. first 1,1 sensor table SR Sm SL csv. ②



<u>classifier</u>

SR	Sm	SL	ER	EL	CR	CL	next label (action)
F	T	F	10°	10°	100 ~~[illegible]~~	100	drive_fwd.
F	T	T	20°	20°	100	100	turn_left
F	F	T	40°	30°	100	50	turn_left
T	T	T	50°	40°	100	50	turn_right



Today we'll mostly talk about classifiers.

Later we can train them.

True detection turns out to be hard.

→ GOFAI.

Good ol' fashioned AI approaches assumed we could just find the perfect formula.

If you try that with your robots, you will fail.

Instead, true detection requires many small adjustments to a prediction model, which we call <u>learning</u>. Instead of a <u>rule</u>, ML is a process.

However, this means that the "rules" are very hard for a human to understand.

Try it out:

install processing.video.
→ sketch > import library > manage libraries
→ search video, P4 install

install deep vision
install JavaFX
↳ add to sketch.

☆ emotion detection. - pair

☆ pose detection - class.

☆ try out a few.

↳ when does it work?

→ when does it fail?

→ why?

Design a labelling protocol:

1. Decide which cases need to be classified.
2. Determine which features could be added.
3. Determine which labels are needed.
4. Design experimental apparatus + protocol.

↓ human parts

↓ machine parts.

COGS 300 **Detection 04** Oct16/25

warm up: Draw a maze.
It can be a single line,
or it can branch.

single

branch

is there some equivalence?

Reminder: **Alumni** event Koerner's @ 6p
Fr: Oct 17

intro communication media

↳ circuits

→ estimation mechanics.

movement (embodiment)

↳ sensor

→ actuator

→ signal encoding (PWM)

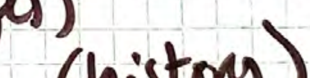
→ modularity (servos) cybernetics

control PID

ref comparator

↳ measurement filtering

→ signal noise



→ prediction

Detection (modelling)

↳ probability (Bayes)

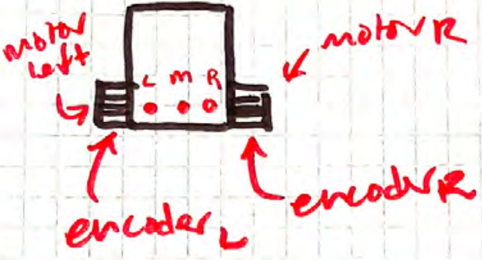
→ repeated Bayes (history)

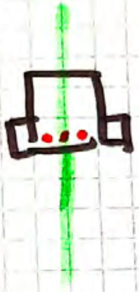
→ inference (Bayes nets)

→ Classification

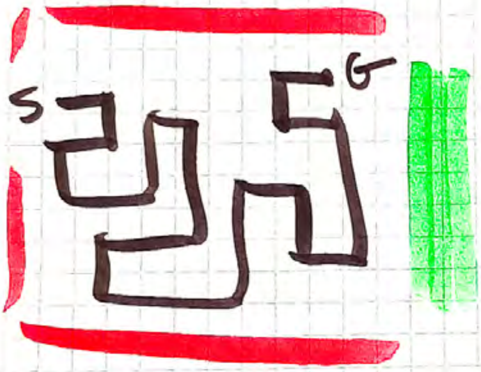
Good ol' fashioned AI

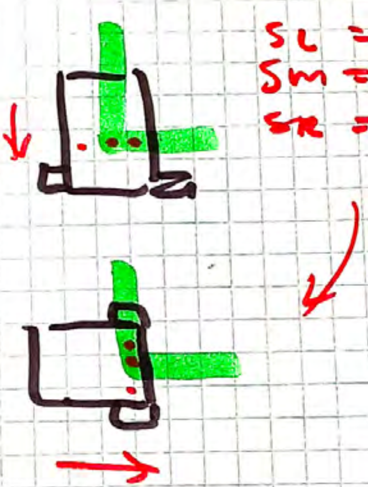
Machine Learning





SL = F
Sm = T
SR = F





SL = F
Sm = T
SR = T

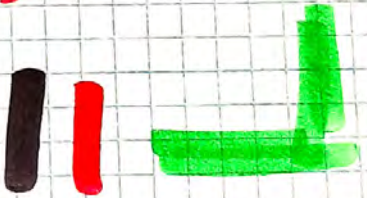


Figure out the cases where robot could be confused or certain

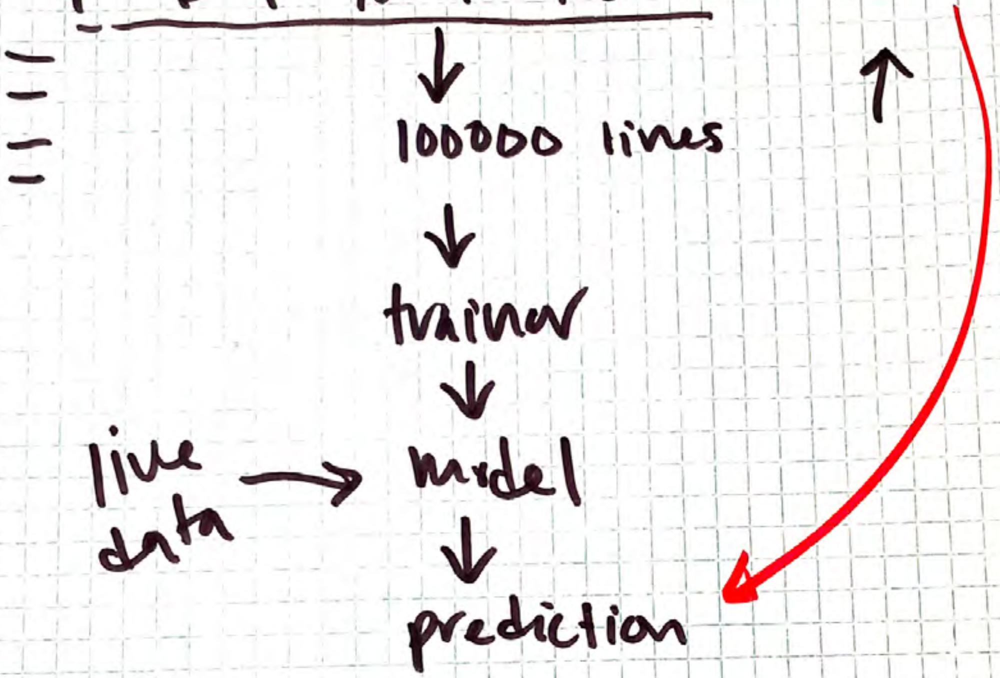
SL	Sm	SR	Next Action	Prev Action ←

T	T	F	↻	L=50%
				R=100

Feature engineering

Classifier

S_R	S_M	S_L	E_L	E_R	M_L	M_R	label
T	F	T	10°	10°	100	50	drive_fwd


100000 lines
trainer
live data
model
prediction