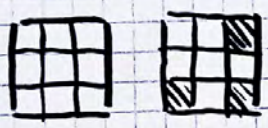
COGS 300 State 04 Feb 26/26

Warm up: Draw "grids" at increasing dimensionality

4D? → colour? / side by side? / projection?

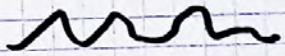
5D? more?

eg.

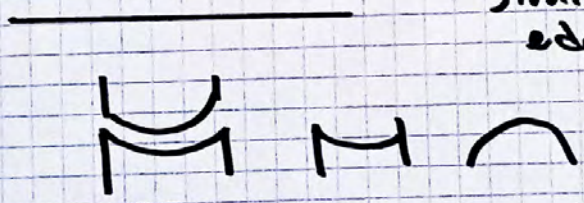


(one "D" is colour)

Dimensionality



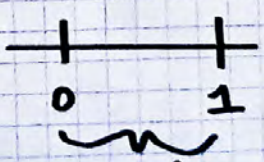
straight edge



reference point / surface

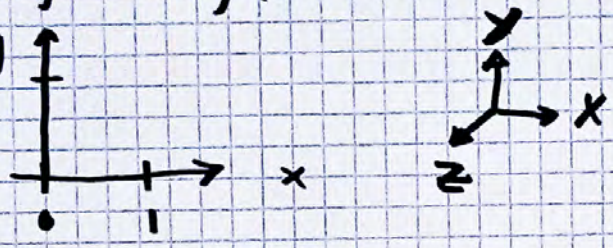
origin

RGB



unit

orthogonality / independence



spatial vs. other dims.

☆ What are other spatial dims than x, y, z?

spherical cylindrical

roll pitch yaw light

time sensors.

tuple list vector

(x, y, z, roll, pitch, yaw)

☆ write down all dimensions for your robot (within reason)

angles sound infrared accel. gravity love

Sensors
- IR_left
- IR_mid
- IR_right
- US_front
- US_side
- En_left
- En_right
- Button

Internal state
- Time
- Running?
- Flags
- motor_L
- motor_R

Calculated state
- speed
- direction
- position
- ⋮

line?
↓
left of line?

↑ estimates

objective measures.

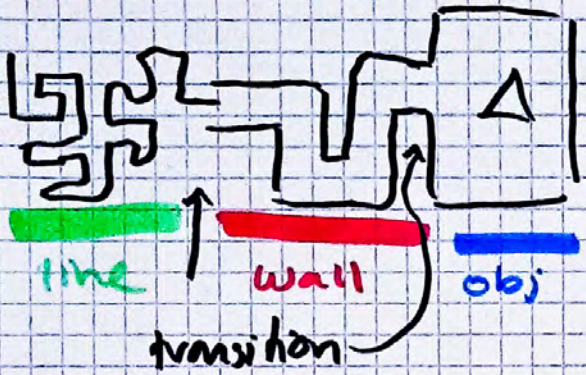
known / unknown

Naive Bayes Classifier

★ Create simulated data w/ robot state

En_L En_R ⋮ Position

★ which dimensions give which state?



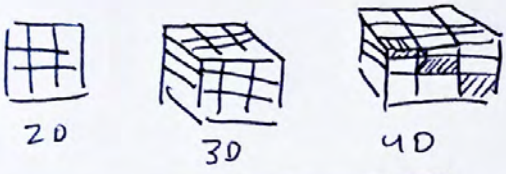
white tape

↳ line following? wall vs. obj
→ line?

☆ How to make transitions as easy as possible?

State 04

warm up: Draw a "grid" with 2D, 3D, 4D, or more.

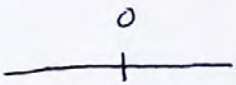


colour?

Dimensionality.

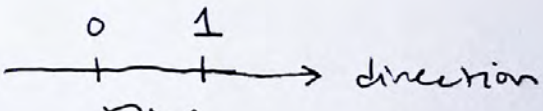
State = feature set = properties = dimensions.

what makes a dimension?

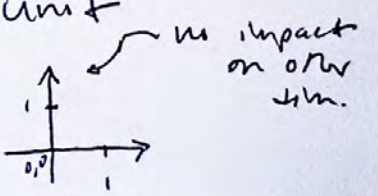


↑ reference point = no difference.

spatial dims.



orthogonality (independence)



index: (0, 0) tuple, vector ?

but what about higher spatial dim

(x, y, z, 0) ☆ Q.

(x, y, z, ...) ?

Robotics uses (x, y, z, roll, pitch, yaw) pretty often.

your robot ~~can~~ can use a state vector for all known quantities.

s_1 s_2 s_3 ...

☆ make a list of all measurable quantities, dimensions, categories. for your robot.

IR_L IR_M IR_R us_1 us_2 out_1 out_2 etc.

The state of your robot is the full feature set or list of dimensions.

☆ make a simulated dataset.

$$\hat{y} = \text{argmax}\ P(x \mid y) P(y)$$

$$P(AB \mid C) = P(A \mid C) P(B \mid C)$$

sensor data + other state at the same time

condition / time about

Naive Bayes = (Supposedly independent)

☆ add conditions/labels to your simulated dataset.

↳ local conditions.

→ global conditions.

~~search~~ High-Information features.

Can you construct features that uniquely identify a position?

model tournament

☆ design transitions