MDP is a generalisation of the Markov Chain

Hidden Markov model is also a generalisation of the Markov Chain

POMDP is a generalisation of both the MDP and the Markov chain

Markov Chain is a special case of MDP where there are no actions

Markov chain is a special case of Hidden Markov Model where state if fully observable (Observation = full state).

MDP is a special case of POMDP where state is fully observable (Observation = full state).

Hidden Markov Model is a special case of POMDP where there are no actions.

Regression

Given a set of data points

Objective: Come up with equation that approximates those data points

Later query function to approximate values for points that are not in your data set

Linear Regression
Approximate data set as line

Come up with a linear equation that approximates data set

$y = w0 + w1*x$

x is your input parameter

y is your output

w0 and w1 are model parameters.

Learn values of w0 and w1 from data set

$y = w0 + w1*x1 + w2*x2 + w3*x3$ ...

Error determines how good your function is at representing data.

Error specifies if your function is doing a good job of representing data set or a bad job.

Compute error by applying error function for each data point.

Error(p1)+Error(p2)+Error(p3)...

Sum of squares

data set

(x1, y1)
(x2, y2)
(x3,y3)

Learned model f(x)=y=w0+w1x

RMS error = (f(x1)-y1) ^2 + (f(x2)-y2) ^2 + (f(x3)-y3) ^2

Solution to regression problem: function that minimizes your error metric.

Looking for w values that minimize this error function.

Can do regression using other functions

Make constants of functions learned parameters

Example: Quadratic regression

y=w0+w1*x+w2*x^2

Find settings of learned parameters that minimizes error function.

Determine what function to use based on intuition or based on looking at data.