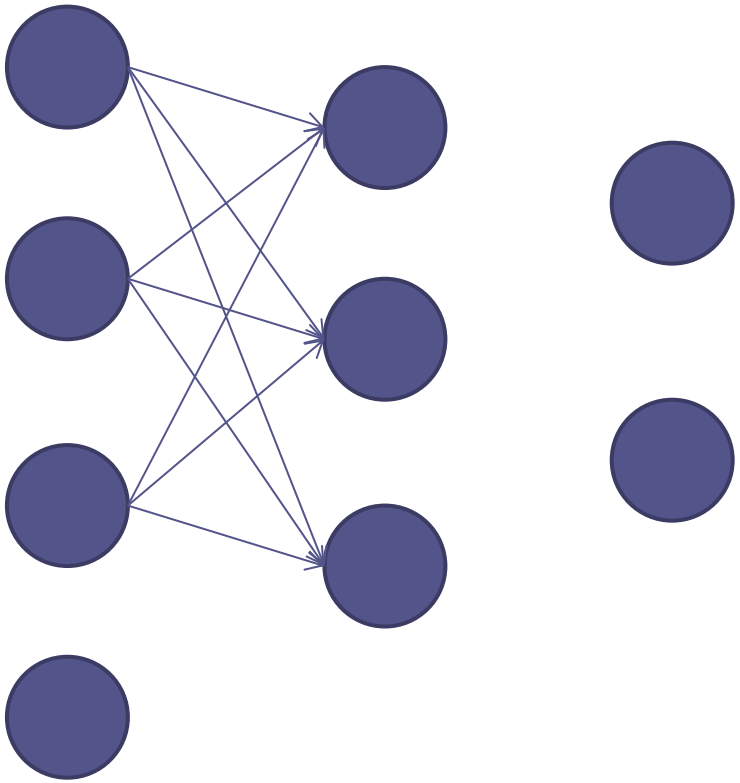
Artificial Intelligence Models

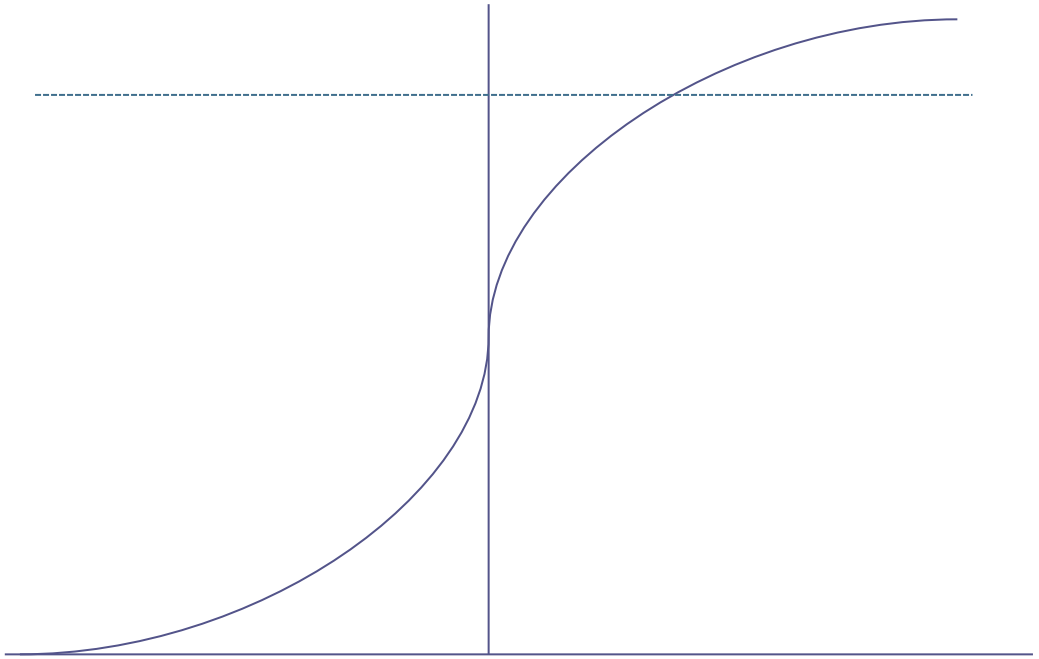
- Very experimental, but timely?
  - Big data

A simple neural network (perceptron)



Neuron fires when the sigmoid function reaches a threshold based on the sum of the weighted inputs

$y=1/(1+e^{-x})$



Results using Scruggs decommodification data with a threshold of 0.9

5000 iterations on 1980 data

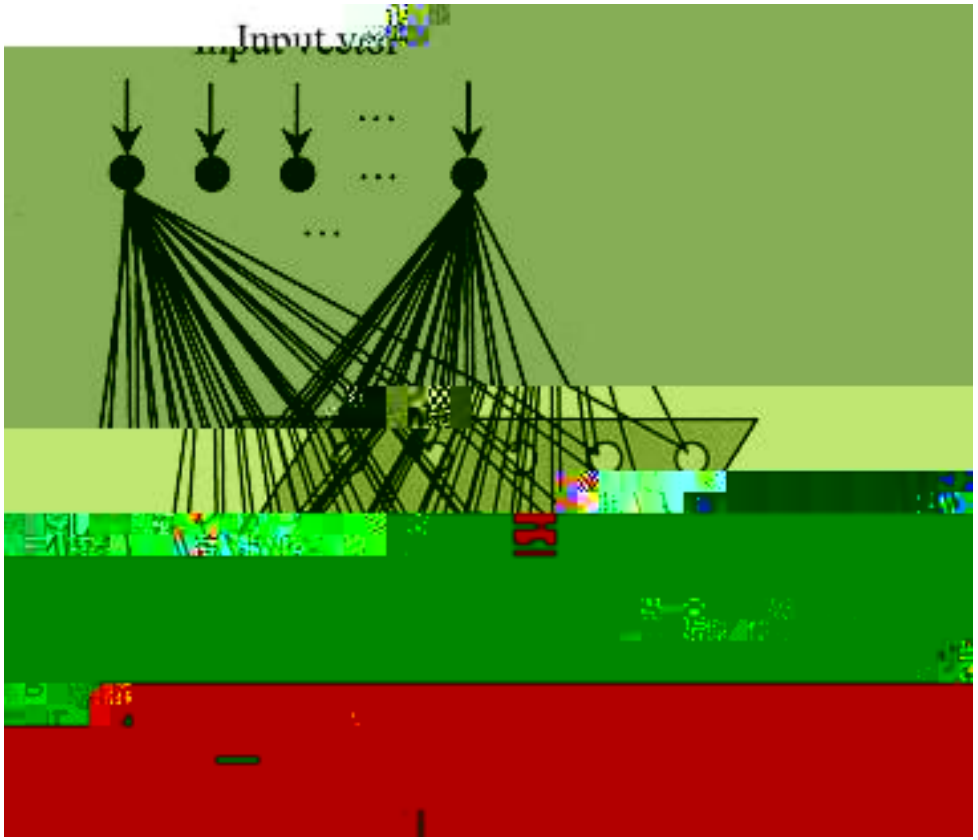
LIB=Liberal
CON=Conservative
SOC=Social Democrat

Country	1971	1980	1990	2000
AU	LIB	LIB	LIB	LIB
AT	CON	CON	CON	CON
BE	CON	CON	CON	CON
CA	LIB	LIB	LIB	LIB (0.872)
DK	SOC	SOC	SOC	SOC (0.864)
FI	SOC	SOC	SOC	SOC (0.640)
FR	CON	CON	CON (0.820)	LIB
DE	CON	CON	CON	CON
IR	LIB	LIB	LIB	LIB
IT	CON	CON	CON (0.891)	CON
JP	LIB	LIB	LIB	LIB
NL	SOC	SOC	SOC	SOC
NO	SOC	SOC	SOC	SOC
NZ	LIB	LIB	LIB	LIB
SW	SOC	SOC	SOC	SOC (0.806) LIB (0.450)
CH	CON (0.888)	LIB	LIB	LIB
UK	LIB	LIB	LIB	LIB
US	LIB	LIB	LIB	LIB

Other possible directions

- How to interpret weights in the network
  - This is very difficult
- Statistical properties of the weights
  - Develop pseudo-T statistics
-

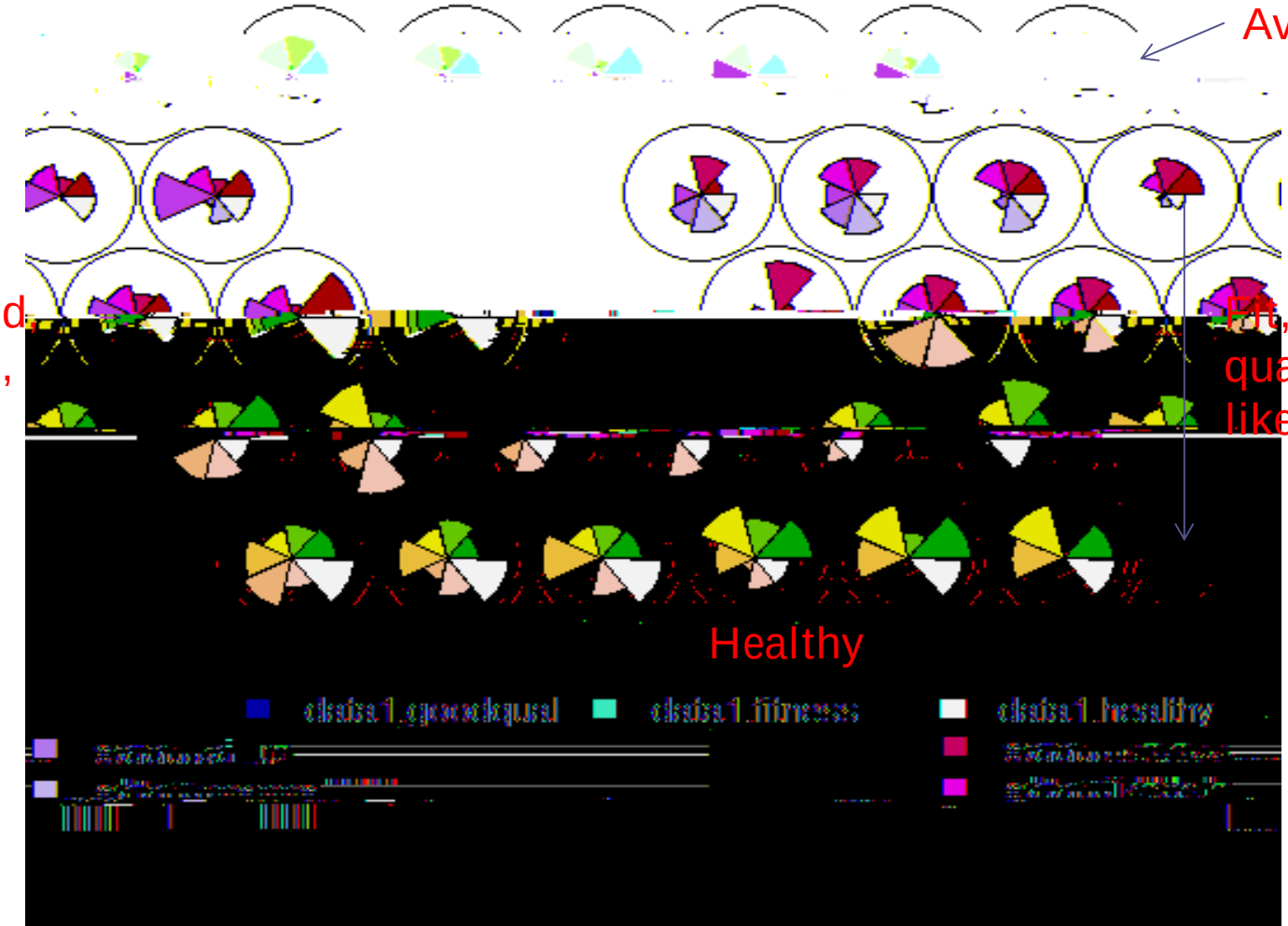
A vector (set of data points) is mapped onto a lattice via a network of weights



British Youth Panel ‘self-esteem’ data

- BYP around 1000 teenagers wave D (1994)
- Part of the BHPS and collected annually
- Data on self-esteem (4 point scales)
  - I have good qualities
  - I feel useless at times
  - I’m a likeable person
  - Enjoy exercise to keep fit
  - Feel a failure
  - Feel I am no good
  - Health is good

SOM of self-esteem using BYP 1994 (using R)



Example

- Could develop a model of well-being (i.e. fitness) based on the interaction of several characteristics using real data
  - (perhaps using a neural network architecture based on several interactions via a hidden layer)
- Code these characteristics into a chromosome pool based on the data
- Run the GA on the data
- Compare the fitness of the real population against the ideal one