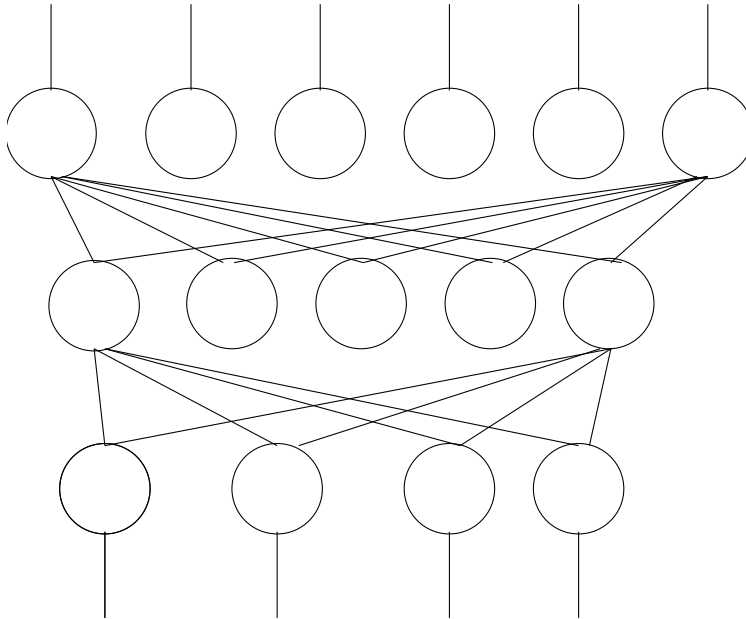

NETWORK WITH MULTIPLE OUTPUTS

INPUTS



OUTPUTS

Possible training dataset for this network

1	1	0	0	1	1	1	0	0	1
0	1	1	0	1	0	1	0	1	1
1	1	0	0	0	0	1	1	0	1

Another possible training dataset for this network

0.1	0.2	0.3	0.0	1.0	0.5	0.7	0.8	0.0	1.0
0.3	0.2	0.8	0.1	1.0	0.4	0.2	0.7	0.9	1.0
0.2	0.9	0.3	0.0	0.3	0.2	0.8	0.3	0.2	0.1

Targets must be between 0.0 and 1.0.

BASIC JAVANNS

- Why Javanns?
 - Doesn't require programming
 - Matlab: You need to be proficient in matlab
 - Keras/Tensorflow: Need to know python.
 - Weka: Hides too much data prep and training methodology
- Training a network for the XOR problem
- Using existing network
- Demonstration

CLASSIFICATION WITH ANNS 1

@RELATION iris

@ATTRIBUTE sepallength REAL

@ATTRIBUTE sepalwidth REAL

@ATTRIBUTE petallength REAL

@ATTRIBUTE petalwidth REAL

@ATTRIBUTE class {setosa,versicolor,virginica}

@DATA

5.1,3.5,1.4,0.2,Iris-setosa

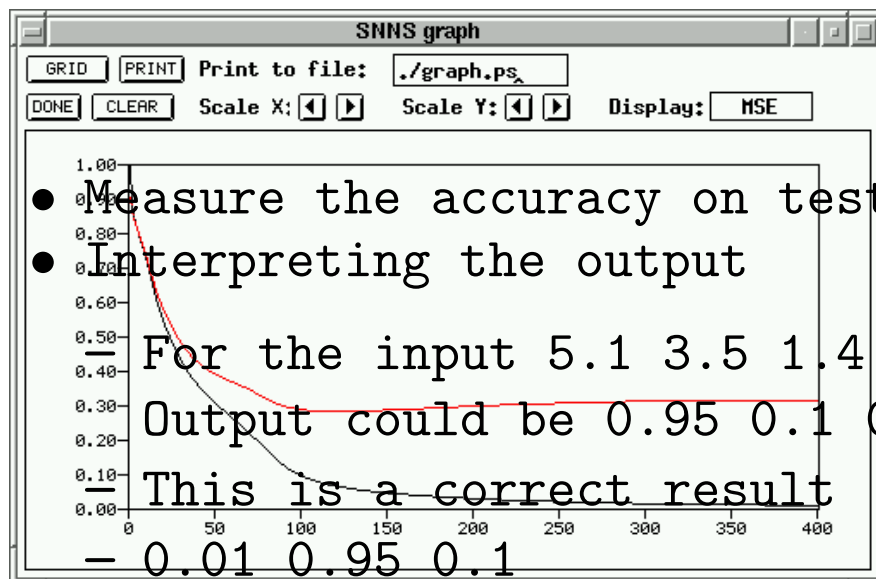
- How to build a NN classifier?
- 4 input nodes. Numeric values are OK as inputs
- 3 output nodes

Class	O_1	O_2	O_3
setosa	1	0	0
versicolor	0	1	0
virginica	0	0	1

- Training pattern
5.1 3.5 1.4 0.2 1 0 0
- Guess at the number of hidden units
If training successful try with a smaller number of hidden units to reduce overfitting

CLASSIFICATION WITH ANNS 2

- Divide data into:
Training (50%)
Validation (20%)
Test (30%)
- Train network. Stop when validation error begins to rise



would be incorrect.

- Network predicts class corresponding to highest output activation

CLASSIFICATION WITH ANNS 3

- For a single output

- 402040 Method



- If output is in range $[0.0, 0.4]$ treat as 0
- If output is in range $[0.6, 1.0]$ treat as 1
- If output is in range $[0.4, 0.6]$ no decision, unclassified
- To avoid 'no decision' (500050)



- For multiple outputs (eg iris)

- If $LargestOutput \geq 0.6$, treat as 1
- treat all others as 0
- else, if $0.4 \leq LargestOutput < 0.6$ no decision
- else treat all outputs as 0.
- SNNS analyze (default) does this

SNNS ANALYZE

- Program

Directory:

/KDrive/SEH/SCSIT/Students/Courses/COSC2111/DataMining/

Programs:

javanns/analyse (Titan/Saturn/Jupiter)

javanns/analyse.exe (PC)

- Documentation

<http://www.ra.cs.uni-tuebingen.de/SNNS/UserManual/node324.htm>

/KDrive/SEH/SCSIT/Students/Courses/COSC2111/DataMining/

snns/SNNSv4.2.Manual.pdf [Chap 13]