CogSci 109 - PRACTICE FINAL

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December 3, 2006

You will see something very similar to the following description on the exam...

Answer all questions, circle answers on your test, and clearly fill out the scantron using a pencil.

5 points each problem. Each one has ONE answer (A, B, C, D, or E).

Answer each question using the information presented during this course, or from the readings. If there is a conflict between what is from a reading vs. what was presented in lecture, use the lecture material for the response, unless it is an equation (ask questions about equation inconsistencies). In other words if a word means a different thing in common conversational use than how it is used within the scientific context of this course, use the context of this course for interpretation.

1 Multiple choice problems

1.1) You want to save a variable from memory in matlab to a binary .mat data file. Which of the following is the correct syntax to save a variable called variablename?

A) `save mydata.mat variablename`

B) `export`

C) `delete mydata.mat variablename`

D) `load mydata.mat variablename`

E) `import mydata.mat variablename`

1.2) The perceptron learning algorithm is a(n)...

A) Method to reform Decepticons to turn them into Autobots.

B) Threshold Logic Function.

C) Method of altering the weights of a perceptron to train it so it will respond with similar outputs, given certain inputs, to the training data.

D) Method of stabilizing Hopfield networks.

E) Method of spherical linear interpolation.

1.3) Which of the following is NOT true about Supervised Learning (look for one answer)?

A) It is one method used to train perceptrons to act as binary classifiers.

B) Involves a training set presented to the network.

C) Some supervised learning algorithms use gradient descent as part of the weight update procedure.

D) The algorithm does not employ an error signal as part of the weight update algorithm.

E) The algorithm employs an error signal as part of the weight update algorithm.

1.4) When you take the transpose of a 2 dimensional matrix, you exchange the...

A) Inverse of the matrix and the matrix.

B) Covariance of the matrix and the variance.

C) Last values in the matrix with the first values.

D) Signs of all the numbers in the matrix.

E) Rows with the columns.

1.5) A very good model of a system is the same as the real physical system

A) True.

B) False.

1.6) Low pass filters increase the amount of information contained in a measured signal in which of the following cases?

A) The code executes faster than without the filter.

B) By taking away data points.

C) By adding data points.

D) It doesn't add information. There is no way to truly 'Add' information into a measured signal, only extract information, and possibly make educated improved guesses. Filters help with that aspect, depending on what information in the signal we are interested in.

E) Any case with plastic.

1.7) Gradient Descent Algorithms find an exact solution for every type of problem

A) True.

B) False.

1.8) What is the fundamental concept of function minimization?

A) Difficult (especially large sets of) equations (or large data fits) are solved by taking the matrix inverse.

B) It cannot solve nonlinear functions.

C) It is a programming algorithm which has no relationship to solving problems in any useful way.

D) One randomly guesses a solution, and if it is correct, the algorithm stops. This has nothing to do with any equations.

E) A problem-specific cost function is minimized by an iterative procedure. Typically in function minimization one uses this to fit parameters of an equation to data.

1.9) A local minimum of a cost function is

A) Always a global minimum for all problems.

B) One minimum, which may or may not be the global minimum for a nonlinear function with many minima.

C) Never a minimum whatsoever of a function.

D) An all-day sale at the little shoe store across the street - they only sell to locals.

E) The first point in the data.

1.10) Which of the following is an example of a 3 dimensional surface interpolation technique?

A) LERP.

B) BERP.

C) TERP.

D) SLERP.

E) Lagrange.

1.11) ———— is a curve fit where the curve fits through ALL data points exactly, whereas ————— is a curve fit where the curve approximates the data points, but does not necessarily fit through them exactly.

A) Lagrange polynomial interpolation / Nonlinear Least Squares.

B) Nonlinear Least Squares / Lagrange polynomial interpolation.

C) LERP / BERP.

D) A Bezier curve / Linear Least Squares.

E) Both B and D.

1.12) Extrapolation of data points means

A) Removing extra points from the data set.

B) Adding up all the errors, squaring them and subtracting the mean. This creates a new set of data points.

C) Trial and error placement of an electrode in a neuron to measure EEG signals in the brain.

D) Making an educated guess for one or more data points given existing data (usually using a curve fit, but probability may be used as well).

E) Copying data from the end of a data set to the beginning to make a longer set of data points.

1.13)The Turning Test for intelligent machines is a test for determining whether a machine exhibits intelligence which...

A) Consists of an interrogator testing two individuals hidden in another room by administering electric shocks and tries to determine by their cries who is real and who is artificial. Passing the Turing Test consists of tricking the interrogator into thinking the artificial device is a person by voice quality.

B) Two individuals in two separate rooms play chess against each other on a text terminal and whoever wins is artificial.

C) An interrogator actively questions two individuals over a text interface (the individuals are in completely separate rooms) to attempt to determine whether one of them is artificial or not. Passing the Turing Test consists of tricking the interrogator into thinking the artificial device is a real person.

D) Was developed in 1979 by McCulloh and Pitts.

E) Another word which means Depth First Search.

1.14)As of 2006 every machine has passed the Turing Test, demonstrating some form of intelligence according to the Turing test criterion.

A) True.

B) False.

1.15)Which of the following aspects of knowledge representation in artificial intelligence is NOT true

A) A big part of knowledge representation is determining how to encode the information strategically.

B) Knowledge is often useful for solving complex tasks, however there are strategies which do not require prior knowledge of the system to solve a problem, such as some methods of search.

C) Part of the challenge is determining how to access the knowledge quickly and efficiently.

D) It is just another word for data representation.

E) Accessing the knowledge quickly and easily becomes challenging because even simple problems tend to result in large quantities of information being encoded.

1.16) Which of the following is NOT a technique to help prevent overfitting when training Artificial Neural Networks?

A) Pitts permutation.

B) Regularization by reducing the number of hidden units or weight decay.

C) Early Stopping using validation sets.

D) MacKay integration.

E) Both A and D.

1.17) Given the following data plot, which form of function fit of the choices given would you intuitively choose, if you want the computationally least expensive (least number of calculations) answer which gives the smallest error, and fits the general trend of the data?

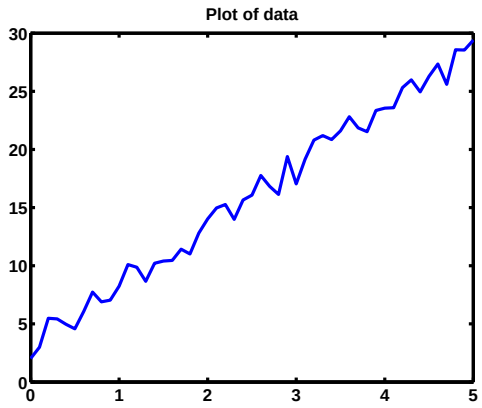

Figure 1: Data plot for problem 17

A) Linear least squares fit.

B) Quadratic least squares fit.

C) Cubic spline interpolation.

D) Lagrange polynomial fit.

E) An infinite loop.

1.18) We want to create fits which are relevant not only for the current data set but also for the general case of the relationship between one variable and another. This is the intention of creating a model that has which of the following characteristics?

A) More generalization.

B) More overfitting.

C) Evil.

D) Exponential complexity.

E) Both B and D.

1.19) Understanding the difference between the color gamut of a printer vs. a computer monitor is important because

A) It's not important. Nobody cares.

B) Printers normally have a wider color gamut than computer monitors, so you would want to make more colors part of the image than you can display on the screen.

C) The computer monitor probably is able to display more colors than can be printed with most printers. Therefore an image which clearly displays information on the monitor may not communicate information well when printed.

D) The equations for a computer monitor are the inverse of the equations for the printer.

E) Both A and D.

1.20) What does the ; operator do in matlab (ie if you had x=5; vs. x=5)?

A) Shutdown the entire network.

B) Cause output to be printed to the screen from calculations.

C) Nothing.

D) Prevent output to the screen of the results of the calculation on that line.

E) Take the transpose of a matrix.

[END OF PRACTICE FINAL :)]