# Data Science & Artificial Intelligence

## Machine Learning

### Linear Classification & Logistic Regressio

**Discussion Notes**

DDP - 1

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**[MCQ]**

#Q. In a logistic regression(Linear Classifier) problem, what is a possible output for a new instance?

A ~~0.85~~

B -0.19

C 1.20

D 89%

Range b/w 0 & 1

[MCQ]

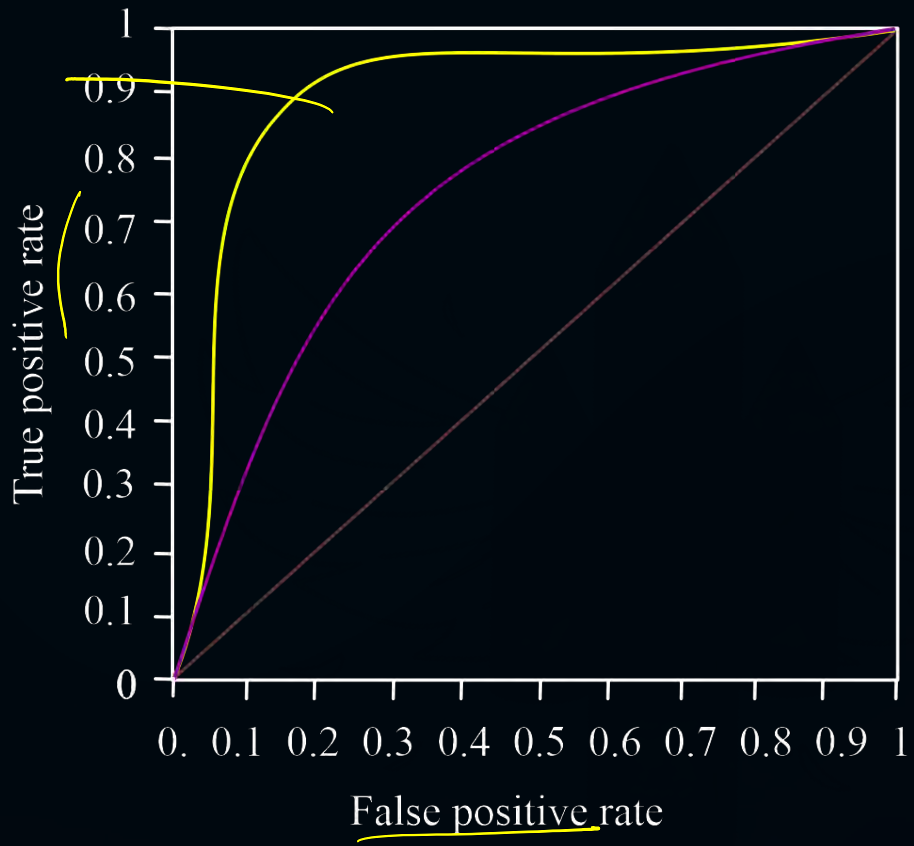
#Q. The below figure shows AUC-ROC curves for three logistic regression models. Different colors show curves for different hyper parameters values. Which of the following AUC-ROC will give the best result?

A Yellow

B Pink

C Brown

D All are same



[MSQ]

#Q. In the regression model ($y = a + bx$) where $x = 2.50$, $y = 5.50$ and $a = 1.50$ ($x$ and $y$ denote mean of variables $x$ and $y$ and $a$ is a constant), which one of the following values of parameter 'b' of the model is correct?

A. 1.75

B. 1.6

C. 2.00

D. 2.5

$y = a + bx$

$\bar{x} = 2.50$

$\bar{y} = 5.50$

$a = 1.50$

($\bar{x}$ & $\bar{y}$ → mean varig & $x$ & $y$

$y = a + bx$

$5.50 = 1.50 + b \times 2.50$

$= 1.60$

[MCQ]

#Q. Which of the following is an advantage of linear classification algorithms?

A They are highly interpretable

B They can capture complex non-linear relationships in the data

C They are less sensitive to outliers compared to other algorithms

D They require less computational resources for training and prediction

[MCQ]

#Q. The hypothesis is given by $h(x) = t_0 + t_1x$. What are $t_0$ and $t_1$?

A Value of h(x) when x is 0, intercept along y-axis

B Value of h(x) when x is 0, the rate at which h(x) changes with respect to x

C The rate at which h(x) changes with respect to x, intercept along the y-axis

D Intercept along the y-axis, the rate at which h(x) changes with respect to x

**[MCQ]**

#Q. In continuation with question 7, let x = 1 if the server is wearing black shirt and x = 0 for servers wearing other colored shirts. We know that there are 2 points 70 observations with x 1 and 340 observations with x = 0. The response variable is also an indicator variable given by y = 1 if the customer left a tip and y=0 if the customer did not leave a tip. Use this data to fit a logistic regression model to compute the log-odds of leaving a tip depending on the color of the server's shirt.

A. -0.4797 +0.1249x

B. 0.2877 +0.1249x

C. 0.1249+0.4317x

D. -0.4797 +0.7674x

[MCQ]

#Q. In Simple Logistic regression the predictor ...?

A is interval/ratio data

B must undergo a logarithmic transformation before undergoing logistic regression

C be in the range of 0 to 1

Out-come or dependent Variable

D represent ranked scores

E be a binary variable

**[MCQ]**

#Q. Given an example from a dataset (x1, x2) = (4, 1), observed value y = 2 and the initial weights w1, w2, bias b as -0.015, -0.038 and 0. What will be the prediction y'.

A) 0.01

B) 0.03

C) 0.05

D) 0.1

$x^1 = 4,\ x^2 = 1,\ w_1 = 0.015\quad w^2 = -0.038\quad y = 2$

$b = 0$

$y' = w^1 x^1 + w^2 x^2 + b$

$(-0.015 \times 4) + (-0.038 \times 1) + 0$

$= -0.1$

[MCQ]

#Q. A classification table: (one correct choice)

A. helps the researcher assess statistical significance.

B. indicates how well a model has predicted group membership.

C. indicates how well the independent variable(s) correlate with the dependent variable.

D. provides a basis for calculating the exp(b) value

**[MCQ]**

#Q. Likelihood (In the statistical sense) . . (one correct choice)

A. Is the same as a p value

B. Is the probability of observing a particular parameter value given a set of data

C. attempts to find the parameter value which is the most likely given the observed data.

D. minimizes the difference between the model and the data

[MCQ]

#Q. A Maximum Likelihood Estimator (in the statistical sense) . . (one correct choice)

**A** Is the same as a p value

**B** Is the probability of observing a particular parameter value given a set of data

**C** attempts to find the parameter value which is the most likely given the observed data.

**D** Is the same as R Square

# [MCQ]

#Q. Why cost function which has been used for linear regression can't be used for logistic regression?

**A** Linear regression uses mean squared error as its cost function. If this is used for logistic regression, then it will be a non-convex function of its parameters. Gradient descent will converge into the global minimum only if the function is convex.

**B** Linear regression uses mean squared error as its cost function. If this is used for logistic regression, then it will be a convex function of its parameters. Gradient descent will converge into the global minimum only if the function is convex.

**C** Linear regression uses mean squared error as its cost function. If this is used for logistic regression, then it will be a non-convex function of its parameters. Gradient descent will converge into the global minimum only if the function is non-convex.

**D** Linear regression uses mean squared error as its cost function. If this is used for logistic regression, then it will be a convex function of its parameters. Gradient descent will converge into the global minimum only if the function is non-convex.