Feedback — XV. Anomaly Detection

Help

You submitted this quiz on **Sun 18 May 2014 11:47 PM IST**. You got a score of **5.00** out of **5.00**.

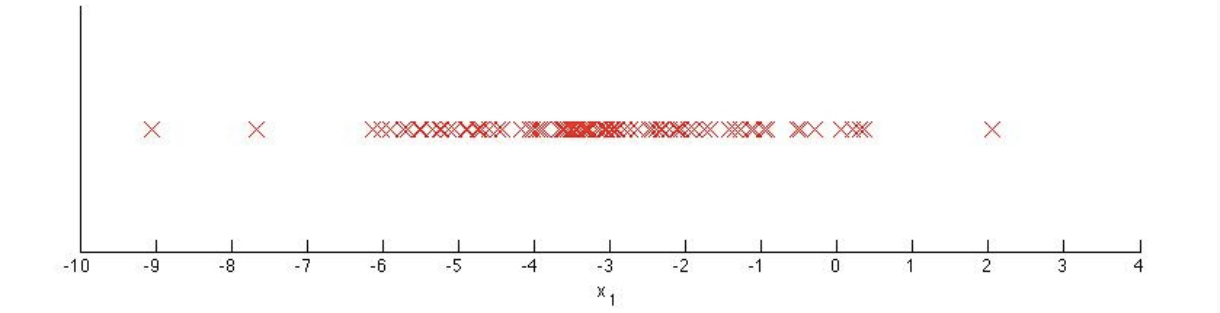
Question 1

For which of the following problems would anomaly detection be a suitable algorithm?

Your Answer		Score	Explanation
☐ Given data from credit card transactions, classify each transaction according to type of purchase (for example: food, transportation, clothing).	✔	0.25	Anomaly detection is not appropriate for a traditional classification problem.
☑ Given a dataset of credit card transactions, identify unusual transactions to flag them as possibly fraudulent.	✔	0.25	By modeling "normal" credit card transactions, you can then use anomaly detection to flag the unusuals ones which might be fraudulent.
☑ In a computer chip fabrication plant, identify microchips that might be defective.	✔	0.25	The defective chips are the anomalies you are looking for by modeling the properties of non-defective chips.
☐ Given an image of a face, determine whether or not it is the face of a particular famous individual.	✔	0.25	This problem is more suited to traditional supervised learning, as you want both famous and non-famous images in the training set.
Total		1.00 / 1.00	

Question 2

You have a 1-D dataset $\{x^{(1)}, \ldots, x^{(m)}\}$ and you want to detect outliers in the dataset. You first plot the dataset and it looks like this:



Suppose you fit the gaussian distribution parameters μ_1 and σ_1^2 to this dataset. Which of the following values for μ_1 and σ_1^2 might you get?

Your Answer		Score	Explanation
$\mu_1 = -6, \sigma_1^2 = 2$			
$\mu_1 = -3, \sigma_1^2 = 4$	✔	1.00	This is correct, as the data are centered around -3 and tail most of the points lie in [-5, -1].
$\mu_1 = -3, \sigma_1^2 = 2$			
$\mu_1 = -6, \sigma_1^2 = 4$			
Total		1.00 / 1.00	

Question 3

Suppose you have trained an anomaly detection system for fraud detection, and your system that flags anomalies when $p(x)$ is less than ε, and you find on the cross-validation set that it is missing many fradulent transactions (i.e., failing to flag them as anomalies). What should you do?

Your Answer		Score	Explanation
Decrease ε			
Increase ε	✔	1.00	By increasing ε, you will flag more anomalies, as desired.
Total		1.00 / 1.00	

Question 4

Suppose you are developing an anomaly detection system to catch manufacturing defects in airplane engines. You model uses $p(x) = \prod_{j=1}^{n} p(x_j; \mu_j, \sigma_j^2)$. You have two features x_1 = vibration intensity, and x_2 = heat generated. Both x_1 and x_2 take on values between 0 and 1 (and are strictly greater than 0), and for most "normal" engines you expect that $x_1 \approx x_2$. One of the suspected anomalies is that a flawed engine may vibrate very intensely even without generating much heat (large x_1, small x_2), even though the particular values of x_1 and x_2 may not fall outside their typical ranges of values. What additional feature x_3 should you create to capture these types of anomalies:

Your Answer		Score	Explanation
$x_3 = x_1^2 \times x_2^2$			
$x_3 = x_1^2 \times x_2$			
$x_3 = \frac{x_1}{x_2}$	✔	1.00	This is correct, as it will take on large values for anomalous examples and smaller values for normal examples.
$x_3 = \frac{1}{x_1}$			
Total		1.00 / 1.00	

Question 5

Which of the following are true? Check all that apply.

Your Answer		Score	Explanation
When developing an anomaly detection system, it is often useful to select an appropriate numerical performance metric to evaluate the effectiveness of the learning algorithm.	✔	0.25	You should have a good evaluation metric, so you can evaluate changes to the model such as new features.
When evaluating an anomaly detection algorithm	✔	0.25	Classification accuracy is a poor metric because of the skewed classes in the cross-

on the cross validation set (containing some positive and some negative examples), classification accuracy is usually a good evaluation metric to use.			validation set (almost all examples are negative).
If you do not have any labeled data (or if all your data has label $y = 0$), then is is still possible to learn $p(x)$, but it may be harder to evaluate the system or choose a good value of ϵ.	✔	0.25	Only negative examples are used in training, but it is good to have some labeled data of both types for cross-validation.
In a typical anomaly detection setting, we have a large number of anomalous examples, and a relatively small number of normal/non-anomalous examples.	✔	0.25	It is the reverse: we have many normal examples and few anomalous examples.
Total		1.00 / 1.00	