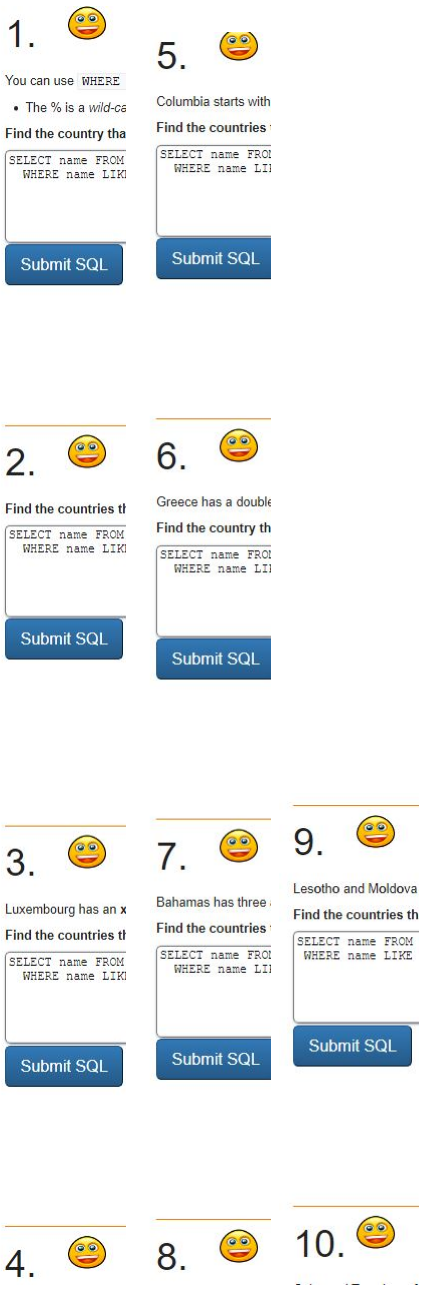
Machine Learning Assignment 64

Colby Roberts

November 16, 2020

64-2



64-3

A

$$P(Y = X(X-1)(X-2)) = \begin{cases} 0 & x = 0 \\ 0 & x = 1 \\ 0 & x = 2 \\ 6 & x = 3 \\ X(X-1)(X-2) & \text{otherwise} \end{cases}$$

B

$$A : \{0, 1, 2, 3\}$$
$$B : P(X \geq 1.5) = \frac{1}{6} + 0 = \frac{1}{6}$$
$$C : P(0 < X < 2) = 0 + \frac{1}{3} + 0 = \frac{1}{3}$$
$$D : P(X = 0 \| X < 2) = \frac{P(X = 0 \cap X < 2)}{P(X < 2)} = \frac{\frac{1}{2} \cdot \cancel{(\frac{1}{2} + \frac{1}{3})}}{\cancel{(\frac{1}{2} + \frac{1}{3})}} = \frac{1}{2}$$

C

$$P(A \cup C) = \frac{2}{3} \;\&\; P(B \cup C) = \frac{3}{4}$$
$$P(A) \cdot P(C) = \frac{2}{3} \;\&\; P(B) \cdot P(C) = \frac{3}{4}$$
$$P(C) = \frac{3}{2 \cdot P(A)} \;\&\; P(C) = \frac{4}{3 \cdot P(B)}$$
$$\implies \frac{2}{3 \cdot P(A)} = \frac{3}{4 \cdot P(B)}$$
$$\implies \frac{3 \cdot P(A)}{2} = \frac{4 \cdot P(B)}{3}$$
$$\implies \frac{9}{8} \cdot P(A) = P(B)$$
$$\implies P(A) = \frac{9}{8} \cdot P(B)$$
$$P(A \cup B \cup C) = \frac{11}{12}$$
$$P(A) \cdot P(B) \cdot P(C) = \frac{11}{12}$$
$$\left(\frac{9}{8} \cdot P(B)\right) \cdot P(B) \cdot \left(\frac{4}{3 \cdot P(B)}\right) = \frac{11}{12}$$
$$\implies P(B) = \frac{11}{18}$$
$$\implies P(C) = \frac{4}{3 \cdot \frac{11}{18}} = \frac{24}{11}$$
$$\implies P(A) = \frac{9}{8} \cdot \frac{11}{18} = \frac{11}{16}$$

D

$$P(\text{Team}) = \begin{cases} P(\text{Team A}) + P(\text{Team C}) = 0.6 \\ P(\text{Team B}) + P(\text{Team D}) = 0.4 \\ P(\text{Team A}) = P(\text{Team B}) \\ P(\text{Team C}) = 2 \cdot P(\text{Team D}) \\ P(\text{Team A}) + P(\text{Team B}) + P(\text{Team C}) + P(\text{Team D}) = 1 \end{cases}$$

$$\begin{aligned} &\cancel{P(\text{Team A})} + P(\text{Team B}) + \cancel{P(\text{Team C})} + P(\text{Team D}) = 1 - 0.6 \\ &P(\text{Team B}) + P(\text{Team D}) = 0.4 \\ &P(\text{Team A}) + \frac{1}{2}P(\text{Team C}) = 0.4 \\ &P(\text{Team A}) + \frac{1}{2}(0.6 - P(\text{Team A})) = 0.4 \\ &\frac{1}{2}P(\text{Team A}) + 0.3 = 0.4 \\ &P(\text{Team A}) = 0.2 \\ &\implies P(\text{Team B}) = 0.2 \\ &\implies P(\text{Team C}) = 0.4 \\ &\implies P(\text{Team D}) = 0.2 \end{aligned}$$

64-4

A

For the training data set the cubic regressor would be more accurate than the linear regressor because the linear regressor would be under fitted to the training data set compared to the cubic regressor, especially if the training data set zig-zags.

B

The linear regressor would be more accurate because the cubic regressor would be over fitted for the linear data, so the linear regressor would be more accurate.

C

For the training data set the cubic regressor would be more accurate than the linear regressor because the linear regressor would be under fitted to the training data set compared to the cubic regressor, especially if the training data set zig-zags.

D

The cubic regressor would be more accurate because the linear regressor would be under fitted for the non-linear data, so the cubic regressor would be more accurate.