Quiz 1

MACHINE LEARNING, SUMMER 2018

Name: UID:

1. (2 point) If X and Y are conditionally independent given Z, then $P(X, Y|Z) =$.

$P(X, Y|Z) = P(X|Z)\,P(Y|Z)$

2 (point 2 = 1+1) What is the support of Beta distribution. What is the support of Dirichlet distribution in dimension D.

support of Beta $[0\ 1]$

support of Dirichlet $[0\ 1]^D$

3 (2 point= 1+1) What is the difference between supervised and unsupervised machine learning.

- In supperviSed learning we have label y_i in training data $D = \{(x_i, y_i)\}_{i=1}^{N}$. This label is used in training phase to train algorithm.
- In unsupervised we don't have y_i and need to find interesting pattern in data $D = \{x_i\}$

4a. (3 points = 1+ 1+1) What is the difference between MLE and MAP estimate of parameters of a distribution. If you don't have many sample from distribution which estimate you will use.

- In MLE we find the parameters of the distribution in such a way that likelihood of event happened is maximum.
- In MAP estimate we choose the mode from posterior distribution of the parameters.
- choose MAP, following expert advise for prior.

4b. (points 3 = 1+1+1) Given $\mathcal{D}$ data we observed and θ is distribution of parameters. Draw arrow to show prior, likelihood and posterior terms in the following expression.

likelihood ↑ , → prior

$$P(\theta|\mathcal{D}) = \frac{P(\mathcal{D}|\theta)(P(\theta))}{P(\mathcal{D})}.$$

→ posterior