

SMAI-M20-Lec 23 Review questions

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Review Question - I (one, none or more correct)

- 0.1 Let $\mathbf{p} = [p_1, p_2]^T$ and $\mathbf{q} = [q_1, q_2]^T$ be two vectors in 2D.
 $\kappa(\cdot, \cdot)$ is a kernel and $\phi()$ is the corresponding feature map.
Let $z = \kappa(\mathbf{p}, \mathbf{q}) = (\mathbf{p}^T \mathbf{q})^2$.
- 0.1.1 z is scalar.
 - 0.1.2 z is unique for the given $\kappa()$.
 - 0.1.3 $\phi()$ is unique given the $\kappa()$.
 - 0.1.4 $\phi() \in R^2$.
 - 0.1.5 All the above.

Ans: AB

Review Question - II (one, none or more correct)

Let $\mathbf{p} = [p_1, p_2]^T$ and $\mathbf{q} = [q_1, q_2]^T$ be two vectors in 2D.
 $\kappa(\cdot, \cdot)$ is a kernel and $\phi()$ is the corresponding feature map.
Let $\kappa() = \sum_{i=1}^P \kappa_i()$. Then the $\phi()$ is

1. $\sum_{i=1}^P \phi_i()$
2. $\prod_{i=1}^P \phi_i()$
3. $\phi()$ is obtained by concatenating $\phi_i()$ s.
4. There is no analytical relationship between $\phi()$ and $\phi_i()$ s.
5. None of the above.

Ans: C

Review Question - III (one, none or more correct)

Let $\mathbf{p} = [p_1, p_2]^T$ and $\mathbf{q} = [q_1, q_2]^T$ be two vectors in 2D.
 $\kappa(\cdot, \cdot)$ is a kernel and $\phi(\cdot)$ is the corresponding feature map.
If $\phi(\mathbf{z}) = [z_1^2, z_2^2, \sqrt{2}z_1z_2]^T$ then $\kappa(\mathbf{p}, \mathbf{q})$ is:

1. $\mathbf{p}^T \mathbf{q}$
2. $(\mathbf{p}^T \mathbf{q})^2$
3. $(\mathbf{p}^T \mathbf{q})^{\sqrt{2}}$
4. $(1 + \mathbf{p}^T \mathbf{q})^2$
5. None of the above.

Ans: B

Review Question -IV (one, none or more correct)

Let $\mathbf{p} = [p_1, p_2]^T$ and $\mathbf{q} = [q_1, q_2]^T$ be two vectors in 2D.
 $\kappa(\cdot, \cdot)$ is a kernel and $\phi(\cdot)$ is the corresponding feature map.
If $\phi(\mathbf{z}) = [z_1^2, z_2^2, z_1 z_2, z_2 z_1]^T$ then $\kappa(\mathbf{p}, \mathbf{q})$ is:

1. $\mathbf{p}^T \mathbf{q}$
2. $(\mathbf{p}^T \mathbf{q})^2$
3. $(\mathbf{p}^T \mathbf{q})^{\sqrt{2}}$
4. $(1 + \mathbf{p}^T \mathbf{q})^2$
5. None of the above.

Ans: B

Review Question -V (one, none or more correct)

Let $\mathbf{p} = [p_1, p_2]^T$ and $\mathbf{q} = [q_1, q_2]^T$ be two vectors in 2D.
 $\kappa(\cdot, \cdot)$ is a kernel and $\phi(\cdot)$ is the corresponding feature map.
If $\phi(\mathbf{z}) = [z_1^2, z_2^2, \sqrt{2}z_1z_2, \sqrt{2}z_1, \sqrt{2}z_2, 1]^T$ then $\kappa(\mathbf{p}, \mathbf{q})$ is:

1. $\mathbf{p}^T \mathbf{q}$
2. $(\mathbf{p}^T \mathbf{q})^2$
3. $(\mathbf{p}^T \mathbf{q})^{\sqrt{2}}$
4. $(1 + \mathbf{p}^T \mathbf{q})^2$
5. None of the above.

Ans: D