NEURONS (1/1 point)

A mouse brain has approximately how many times as many neurons as the brain of a larval zebrafish?

- 80
- 800 ✔
- 8000

EXPLANATION

A larval zebrafish has approximately 100,000 neurons while a mouse has approximately 80,000,000 neurons.

CHECK HIDE ANSWER

FMRI (1/1 point)

fMRI scanners provide too low of a resolution to tell, in detail, what is occurring at the neuron level.

- True ✔
- False

EXPLANATION

fMRI provides a coarse-grained view of neural activity.

CHECK HIDE ANSWER

LIGHT-SHEET MICROSCOPY (1/1 point)

Light-sheet microscopy can only be used in transparent animals.

- (•) True ✔
- ( ) False

EXPLANATION

Light-sheet microscopy can only be used in transparent animals like the larval zebrafish.

CHECK HIDE ANSWER

EXPERIMENT DATA (1/1 point)

According to the lecture, recording the neuron activity of the entire brain of a larval zebrafish during a typical experiment requires:

- ( ) 1 MB of data
- ( ) 1 GB of data
- (•) 1 TB of data ✔
- ( ) 1 PB of data

EXPLANATION

Recording the neural activity for the larval zebrafish's 100,000 neurons requires approximately 1 TB of data.

CHECK HIDE ANSWER

CLUSTERING (1/1 point)

Clustering is a supervised learning technique.

- True
- False ✔

EXPLANATION

Clustering does not use labels. It attempts to place similar (according to some measure of similarity) observations into groups based on their features.

CHECK HIDE ANSWER

PCA DISTANCE METRIC (1/1 point)

When working with two dimensional data, if we project data points onto the top principal component (which is a line in 2D space), the distance between the projected points and the original points minimizes which distance?

- vertical distance
- euclidean distance ✔
- manhattan distance
- horizontal distance

EXPLANATION

PCA minimizes the euclidean distance between points and their projections.

CHECK HIDE ANSWER

COVARIANCE MATRIX SYMMETRY (1/1 point)

The covariance matrix is asymmetric.

- True
- False ✔

EXPLANATION

The covariance matrix is symmetric. The covariance between vectors u and v is equal to the covariance between v and u, i.e. cov(u, v) == cov(v, u).

CHECK HIDE ANSWER

COVARIANCE MATRIX DIAGONAL ENTRIES (1/1 point)

The values along the diagonal of the covariance matrix are variances.

- True ✔
- False

EXPLANATION

Along the diagonal of the covariance matrix, the values are the covariance of a feature with itself, which is the variance of the feature, i.e. cov(x, x) == var(x).

CHECK HIDE ANSWER

PRINCIPAL COMPONENTS PROPERTIES (1/1 point)

For a set of principal component vectors, the dot product between any two distinct vectors equals:

- One
- Zero ✔

- d -- the number of features

EXPLANATION

Principal component vectors are orthnormal, which means that they are pair-wise perpendicular. The dot product of perpendicular vectors is zero.

CHECK HIDE ANSWER

PRINCIPAL COMPONENTS (1/1 point)

Principal components equal the eigenvalues of some matrix.

- True
- False ✔

EXPLANATION

Principal components are eigenvectors of the sample covariance matrix.

CHECK HIDE ANSWER

NUMBER OF PRINCIPAL COMPONENTS (1/1 point)

Given a d-dimensional dataset with n observations, the total number of principal components is:

- n
- d ✔
- some other number

EXPLANATION

The total number of principal components equals the number of dimensions of the data.

CHECK HIDE ANSWER