Matrix methods in data science – Exam questions.

1. How can we use a least squares problem for the classification fo training data and how can we use this for a new data point?

2. What is the QR decomposition and how to we use it for least squares problems? How to compute the QR?

3. What is ridge regression and why do we need it?

4. Describe the SVD and what are its important properties?

5. How can we use the SVD for the MNIST problem?

6. What is the CUR decomposition? What are leverage scores?

7. What is the DEIM-based CUR?

8. What is the NMF and what can we use if for?

9. Describe a tensor and quantities such as fibre, slice and matricization.

10. What is the Khatri-Rao product and the Hadarmard product?

11. Describe the CP format and how to compute it.

12. What is the HOSVD?

13. Describe K-means!

14. What is the graph Laplacian and how can we use it for clustering?

15. Describe deep learning.

16. What is kernel ridge regression?

17. Why do we need kernels?

18. What does logistic regression do?