ECE 521 Assignment 1

# Part 1: Euclidean distance

As stated in the assignment for input tensor and input tensor the Euclidean distance is

The **euclidean\_distance** (Appendix A) function evaluates this using vectorization. It first converts the input matrices into 3D tensors of shape and for input tensors and , respectively. These new tensors are subtracted from each other which broadcasts both vectors into the shape of a tensor before evaluation. This resultant tensor is then piecewise squared and all the elements on the length axis are summed together to result in the Euclidian distance matrix.

# Part 2: Regression

## Question 1: Choosing nearest neighbours

# Appendix A – Code

## euclidian\_distance.py

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| **import** tensorflow **as** tf  **def** **euclidean\_distance(**X**,** Z**):**  D **=** X**.**shape**[-**1**]**  X\_int **=** tf**.**reshape**(**X**,** **[-**1**,** 1**,** D**])**  Z\_int **=** tf**.**reshape**(**Z**,** **[**1**,** **-**1**,** D**])**  distance\_pairs **=** X\_int **-** Z\_int  eucl\_dist **=** tf**.**reduce\_sum**(**tf**.**square**(**distance\_pairs**),** **-**1**,** name**=**"euclidean\_distances"**)**  **return** eucl\_dist  **if** \_\_name\_\_ **==** '\_\_main\_\_'**:**  session **=** tf**.**InteractiveSession**()**  X **=** tf**.**constant**([[**1**,**2**,**3**],** **[**4**,**5**,**6**]])**  Z **=** tf**.**constant**([[**7**,**8**,**9**],** **[**1**,**2**,**3**]])**  expected\_result **=** tf**.**constant**([[**108**,** 0**],** **[**27**,** 27**]])**  tf**.**assert\_equal**(**euclidean\_distance**(**X**,**Z**),** expected\_result**)**  **print(**session**.**run**(**euclidean\_distance**(**X**,**Z**)))** |