

ELEC 425 - Fall 2021
Machine Learning and Deep Learning
Lab 2 - Week 6

Welcome to ELEC 425 Lab Session where you will learn machine learning by practicing. For this lab, you are expected to form your own team with 2-3 students to work together on the lab questions. A team should not have more than 3 students. Working on your own is fine, but we encourage collaboration and discussion to solve the lab questions.

If your team can solve the lab questions without further help, you do not have to attend the lab session. Otherwise, we encourage you to attend the lab session in person, and TAs can help you there. If you go the lab session, you can either show your results to TAs to get your marks (3 marks) in the lab session, or you can choose to submit your solutions later on onQ.

Every team has until **9pm Tuesday October 19th** to submit the solutions on onQ. You can submit any time—before, during, or after the lab session (**3:30-5:30pm Tuesday September 19th**). Each team only needs to make one shared submission. If you have received your marks in the in-person lab, you do not have to submit your solutions on onQ.

In your submission, include a file named **students.txt**, which contains all students' names and student numbers of your team. Zip all your code, including the code we provided to you and that you modified, plus the students.txt file, to one zip file named as follows:

Fisrtname-Lastname1_Firstname-Lastname2_Firstname-Lastname2.zip

For example, if your team has Joe Trudeau, Frank Cook, and Peter Martin as the members, you should name the file as Joe-Trudeau_Frank-Cook_Peter-Martin.zip.

1 Introduction

Lab 2 aims to provide hands-on practice on the K-means clustering algorithm. You will be asked to implement the core part of K-means algorithm. You will also observe the E step (assigning data points to clusters) and M step (finding the centre for each cluster) through visualization.

2 K-means Clustering

1. Download lab2_data.zip from OnQ (under “Week 6”) and unzip it.
2. Open *k_means.m*.
3. The code has some parts missing, marked with “XXXXXX”. Right above these missing lines, there are several lines of comments telling you what is missing. Please read those comments and finish the missing code. Specifically, there are three parts of code missing.
4. After you finish the code, run *k_means_main.m* and debug your code. If everything goes well, you should be able to see K-means running.

5. (The following part is for your interest; it is not required in your submission and it will not be evaluated.) In *k_means_main.m*, you may want to change the number of clusters in the last line and play with different numbers of clusters (the current code and visualization support 1 to 4 clusters). Also, you can change how fast the figures are updated in *k_means.m*, i.e., changing the parameter of the *pause* function that is used in the *show* function.

Enjoy Lab 2!!