We do this project by using several steps :

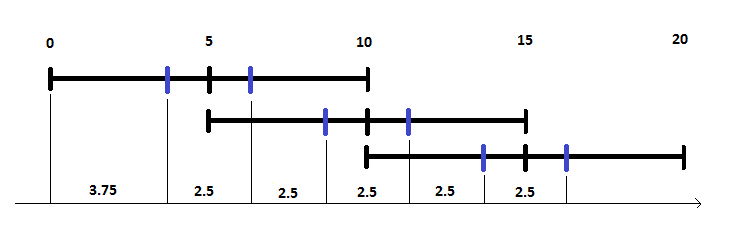
1. Let be the vector of sample data. Firstly, we reshape into a 2-by-((length of )/2) matrix using “*reshape*” from MATLAB in order to make our works easier.
2. After that, we create a smooth curve by the following steps :

* We form a segment (window) using a parameter as the number of adjacent data points to be included in their corresponding windows. For instance, for , we form a window consists of 10 data points.
* We iterate this until we reach the last points of sample data.
* When creating a window, we overlap **the first half part** of the new window with **the last half part** of the previous window. For example, in case of , take 5 points from the last half part of window 1, and use them as the 5 first points of window 2. We do this because we want the points from a window have influence for the next window. If we do this, the two sub-curves will be close and similar, therefore will create a smooth curve.
* Then, we do least square approximation in each window to create a complete curve by quadratic function. This algorithm corresponds to page 43 of Lecture 03, based on the following equation :

1. For each window, determine 2 points of the curve to create B-splines. We want a constant distance between :

* two points on a window, and
* the first point of *k*-th window and the last point of (*k-1*)-th window.

Therefore, we choose points in position and because we observe that they give a constant distance that we want. We can illustrate this as a figure below :



**Figure 1** Illustration of constant distances

1. After determining all control points, we run the de Boor algorithm to find the curve point of the B-splines curve.

To do this, we refer to algorithm in page 32 of Lecture 09, as follows :

1. Search index with
2. For

for

for

with

Then,