MM409/509 Coursework

Each group has been assigned a unique set of data to work with, referred to as `Data.txt` in this document. Before you are assigned the main piece of coursework you should complete the following task on your data. This task will contribute 20% of the final coursework mark.

1. Convert your data set into an adjacency matrix. You can do this using the following commands.

```
C = load('Data.txt');
A = edgeL2adj(C);
```

2. Use MATLAB to visualise your graph. If your graph contains loops or any directed edges you should remove these.

3. Record the number of nodes n and edges m in your graph and compute the following statistics.

   (a) Clustering coefficients.

   (b) Average path length.

   (c) Number of the following fragments in the graph: P_2, C_3, C_4, $S_{1,3}$.

4. Obtain a plot of the degree distribution of the network (a fit of this is not necessary). You should plot both the PDF and CDF.

5. Generate 50 Erdös–Rényi graphs with n nodes and $p = \frac{2m}{n(n-1)}$ and for these graphs compute the mean values of the statistics 3(a)–(c) as well as the mean number of edges.

You should write a short report of you experiment (no more than 2 sides of A4) detailing what you did, presenting a picture of your graph, your results and a comparison of the two sets of statistics. Highlight how your results match the theory presented in lectures. You can add pictures and other context if you think it useful. Detail any steps you take to validate your computations.

As an appendix (not included in the page limit) give a list of the MATLAB commands you used to produce the results, edited for clarity, and listings of any MATLAB programs you write (or citations/web links to any pre-existing programs you use).

You must submit a hard copy of your report (one per group) to Dr Knight by midday on Monday 4th March. You will be given feedback on your submission.