FB - Six Degrees of Separation

(a) First, I used R to read in the 100 network files, calculated diameter and geodesic mean distance and extracted the size of the network and of the largest component (see Excel file in submission folder).

Figure 1: Max diameter versus network size n - FB100 Universities

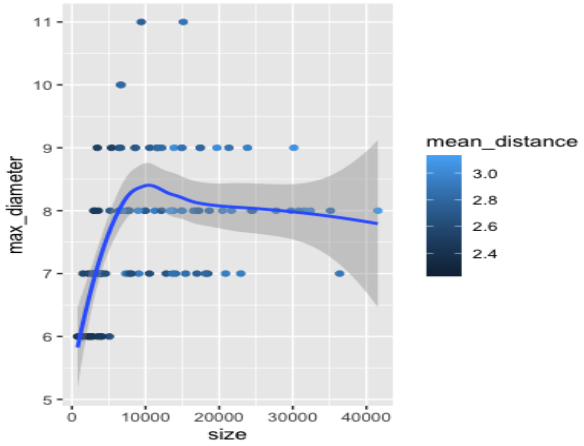
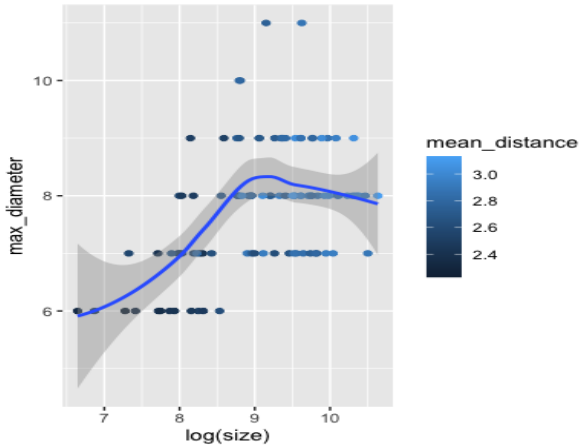


Figure 2: Max diameter versus log network size n



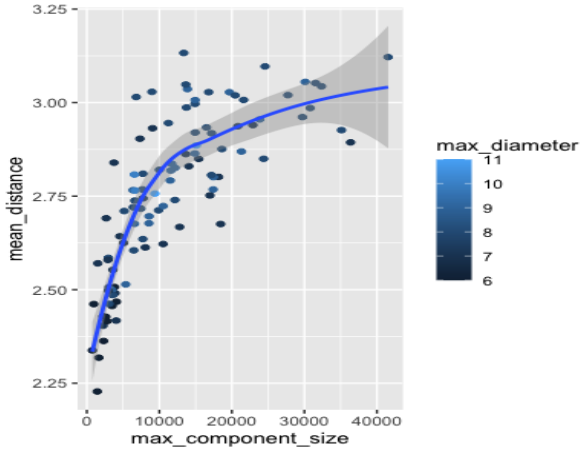
(b)

(c) The six degrees of separation idea indicates that every person is only six connections away from every other person. In Figures 3 and 4, the diameter of the networks is negatively correlated with network size n past 10,000 nodes. This makes sense - as n grows, every node has more opportunities for connections within their community. In this instance, our findings support the six degrees of separation theory for most (not all) nodes within the Facebook network given that diameter does not increase as n increases. The linear relationship between log(n) and the diameter does not hold, supporting the property small-world phenomenon (figure 4).

However we should consider that while the mean geodesic distance is a maximum of around 3, the maximum diameter is most times around 8. While this might decrease with larger networks with more nodes and more interconnectedness, the data we examine is from students within one university and therefore from members within one community possibly creating a bias.

(d) Given the figures, I think the diameter of Facebook has either decreased or stayed relatively stable since 2005. The figures indicate that the maximum diameter grows less than linearly with n and also the growth of the mean geodesic distance flattens out with growing n, which supports

Figure 3: Mean geodesic distance vs. size of the largest component n - FB100 Universities



the small-worlds theory of social networks. To a large extent new members will simply join existing clusters of nodes.