Introduction
On the WWW, a huge body of data is linked and interlinked in complex ways. The way that information spreads through a network can be examined by creating different graph models and comparing their structural properties.

Figure 1. Model of a Social Network [Hannon Digital 2014]

In network analysis, the Erdös Rényi model of random graphs has frequently been used to model real world systems; this model has connections between nodes created with a defined probability parameter.

Figure 2. Erdős–Rényi model of random graph
Random geometric graphs model situations where physical distance between agents is a factor, such as the spread of disease.

Figure 3. Random geometric graph model.
Transitivity measures the links between triples of nodes. A fully transitive relationship is represented by a closed triple, where the "friends of my friends are my friends" [Snijders 2011]. The network average clustering coefficient measures links in the neighbourhood of a node [Watts and Strogatz 1998].

Method
Random geometric graphs were created in the unit square, by generating uniformly distributed random points (x, y) and creating an edge between pairs of nodes wherever the distance between them was less than a specified distance.

Erdős Rényi random graphs were created with defined edge probability parameters. In order to directly compare these models, the geometric graph was converted to a probability model by calculating the distribution of distances within the unit square [Weisstein 2013]. This ensured that at each probability step, both models had identical probability of a connection existing and therefore equal likelihood of similar average degree.

Figure 4. Erdős Rényi degree distribution at edge probability of 0.6
The Erdős Rényi model has a Poisson distribution, where the degree of most nodes is closely distributed around the mean; the random geometric graph has a wider range of values.

Figure 5. Geometric graph degree distribution at edge probability of 0.6
The geometric graph displays markedly higher values for both network average clustering coefficient and transitivity than the Erdős Rényi model. In the latter the two measures coincide, whereas there is significant variance in the geometric model.

Figure 6. Comparison of clustering coefficients in both models

Results
The two models display different patterns of degree distribution at all probability parameters.

Conclusion
Although both models have been created with equal edge probability, the way that the node degrees are distributed throughout the graph is different.

The degree of all nodes in the Erdős Rényi model is closely distributed around the mean, whereas the Random geometric graph has a wider range of values, with a resultant effect on the patterns of node clustering.

The most striking result is that the transitivity and network average clustering coefficients differ within the geometric graphs. This was unexpected, as these measures coincide in the Erdős Rényi model. This raises potential for using these models in network analysis and in game theory applications.

References
Hannon Digital: Social Web Development
http://hannondigital.com/2014/01/02/social-web-development/ (2014)

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