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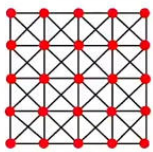
The Small-World Model

小世界模型旨在使平均最短路径保持较短，同时保持较高的聚类系数。这两点某种程度上是相互对立的。

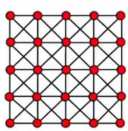


Vs.

Regular lattice graph:
High clustering coefficient
High diameter

G_{np} random graph:
Low clustering coefficient
Low diameter

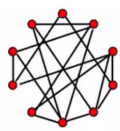
小世界模型的设想是在规则格子图和 Gnp 随机图之间进行插值。



Regular lattice graph:
High clustering coefficient
High diameter

Interpolate

Small-world graph:
High clustering coefficient
Low diameter



G_{np} random graph:
Low clustering coefficient
Low diameter

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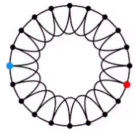
(low-dimensional regular lattice)

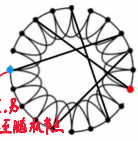
S_1: 从低维规律格点图开始

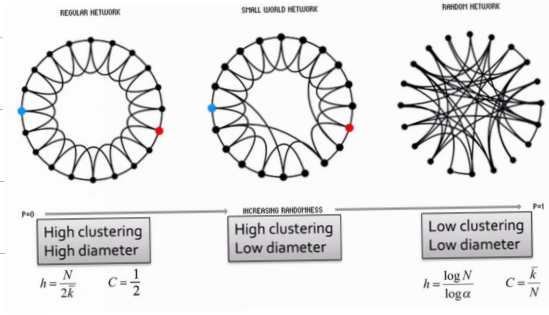
- high clustering coefficient
- high path length



S_2: 通过插值,在远端节点之间建立连接

- 对于每条边,以概率p将其端点移动





事实表明,要破坏聚类分数,需要较大的p,但要建立足够的最短路径,只需要较小的p

The Small-World Model 的弊端是不能建立正确的度分布