Networks and Complexity

Solution 8-4

This is an example solution from the forthcoming book Networks and Complexity.
Find more exercises at https://github.com/NC-Book/NCB

Ex 8.4: Poissonian dictionary [2]

I have a Spanish-Spanish dictionary which I use to look up words, but when I look up a work there are typically a number of words in the explanation that I don't understand, so I have to look up their definitions as well. I noticed that the number of these words follows a Poisson distribution with mean 0.8. Estimate the average number of words that I have to look up to understand the meaning of one word.

Solution

We can think of the words that I don't know as the node in a (directed) network, where $z = q = 0.8$. (The directionality of links does not make it more difficult in this case.) We can straightforwardly estimate the size of the component as

$$S = 1 + \frac{0.8}{1 - 0.8} = 1 + \frac{0.8}{0.2} = 5 \tag{1}$$

So in average I have to look up five words to understand one word.