Introduction

A gene/protein is essential if and only if its removal or disruption results in lethality or infertility of the organism.

There are 4 general problems conserning gene essentiality

1. Evolvability
2. Differential / conditional essentiality
3. Modular essentiality
4. Prediction

All these parameters are part of a bigger theme of biological challenges in the 21th century.

In this work we focused in points 3 and 4.

Prediction of essentiality

History

Current

Centrality measures use the underlying topology of the network to determine node importance quantitatively.

Modular essentiality

The basic work of (Ryan et al. 2013).

Ryan, Colm J., Nevan J. Krogan, Pádraig Cunningham, and Gerard Cagney. 2013. "All or nothing: Protein complexes flip essentiality between distantly related eukaryotes." *Genome Biol. Evol.* 5 (6): 1049–59. doi:10.1093/gbe/evt074.

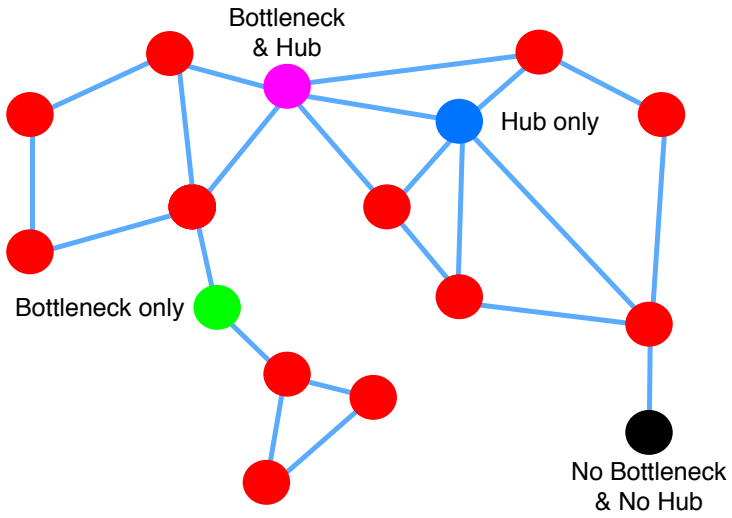

Figure 0.1: A schematic represenation of the difference between hubs and bootlenecks