BACKGROUND

Alzheimer’s disease

Graph theory

Diseases and Networks

Essential proteins play critical roles in cell processes such as development and survival.

Biological network analysis

What are biological networks. What they signify. How they can be used.

Protein-Protein Interactions

What are proteins.

Why are proteins and their interactions important: book page 11

Little on how they are found

PPI databases, how they are built.annotated etc

Network Analysis

Important concepts:

Proteins.

Biological processes

Annotations, GO

BACKGROUND

1. Networks in biology

In every level of biology, biological elements interact with each other and form complex systems. In the study of biological systems, networks are used to model these systems. They can be used to model biological systems to almost every level, from microscopic level with metabolic networks, gene regulatory networks, protein-protein interaction networks, to intercellular networks such as neural networks, and even higher organism level such as ecological networks.

//Little on how biological data is collected

The study of such biological networks is a vital part of understanding complex biological activities. Network analysis has been used for several applications. Protein function prediction examples, disease gene prioritization examples,

Analysis of disease networks can lead to a better understanding of disease mechanisms by helping identify disease-causing genes and pathways, which in return offer targets for drug development(2). The network based approach to studying diseases such as type 2 diabetes(cite) , coronary artery disease(cite) which are caused from smaller defects in multiple genes, allows for a better representation of the disease and makes it possible to view the disease as a more elaborate set of interconnected pathways(1).

//add the other found disease network analysis references.

Studying biological networks can help understand the mechanisms of the biological systems.

Protein-Protein interaction networks

2. Graph/Network Analysis for biological networks

The network can be analyzed for nodes that are more important to the network than others. There are a number of measures that have been found to correspond to biological importance. The identification of such nodes in the network can lead to the identification of targets for drugs, proteins affected by diseases etc.

**Centrality measures**

Centrality measures are used to find how ‘central’ a node is in the network.

Degree

Betweenness

Closeness

Assortativity degree

**Clustering and enrichment**

clustering methods and algorithms

clustering validation

Enrichment