

# Computational Ecology: Graphs, Networks and Agent-based Modeling

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Article

## Application of R to investigate common gene regulatory network pathway among bipolar disorder and associate diseases

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### Abstract

Depression, Major Depression or mental disorder creates severe diseases. Mental illness such as Unipolar Major Depression, Bipolar Disorder, Dysthymia, Schizophrenia, Cardiovascular Diseases (Hypertension, Coronary Heart Disease, Stroke) etc., are known as Major Depression. Several studies have revealed the possibilities about the association among Bipolar Disorder, Schizophrenia, Coronary Heart Diseases and Stroke with each other. The current study aimed to investigate the relationships between genetic variants in the above four diseases and to create a common pathway or PPI network. The associated genes of each disease are collected from different gene database with verification using R. After performing some preprocessing, mining and operations using R on collected genes, seven (7) common associated genes are discovered on selected four diseases (SZ, BD, CHD and Stroke). In each of the iteration, the numbers of collected genes are reduced up to 51%, 36%, 10%, 2% and finally less than 1% respectively. Moreover, common pathway on selected diseases has been investigated in this research.

**Keywords:** bipolar disorder; major depressive disorder; Schizophrenia; gene mining; PPI network and R toolkit.

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### 1 Introduction

Clinical depression, major depression or major depressive disorder is the more severe form of depression. Symptoms of depression can include agitation, restlessness, irritability, anger, lack of concentration or interest, self-hate, hopelessness, helplessness, changes in movement, sleep and appetite, thoughts of death or suicide. Today, depression is estimated to affect 350 million people (WHO). At its worst, depression can lead to

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