**Identifying Probable Protein-Protein Interactions Related to those of Asthma and Allergy Using the Diffusion Kernel**

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Many diseases including cancer, diabetes, and asthma occur due to over-expression or suppression of certain proteins. These proteins come to physical contact with each other due to biochemical events in a process called Protein-Protein Interaction (PPI). Studies have been done on how the PPI networks directly influence the development and progression of some of the diseases. However, little focus has been placed on neighborhood proteins that do not physically interact with each other but have a higher likelihood to interact than the actual PPIs.

In this paper, we seek to predict probable protein interactions related to asthma and allergy. We used 1,425 unique PPI data extracted from the string database. In our proposed approach, the asthma and allergy protein interactions are represented in a two dimensional space called a Laplacian Matrix. The Laplacian Matrix is then used to evaluate a Diffusion Kernel, which assigns kernel values to all possible combinations of the 84 unique proteins associated with asthma and allergy. PPIs that do not belong to set of the actual PPIs, but have greater kernel values than the actual interactions are predicted to be probable PPIs.

From our experiment, we determined a set of probable asthma and allergy PPIs. The resulting prediction, together with the actual PPIs, enables us to establish more comprehensive networks of proteins that cause asthma and allergy diseases. In future, we will investigate the relationship between our proposed protein interaction networks and their biological functionality.

References: Seung-Woo, S., et al. 2008. A Protein Interaction Network Associated with Asthma

Kelvin, C. et al. 2013. Identifying Subnetwork Biomarkers Using scored Protein-Protein interactions and Diffusion Kernel

Database: <<http://www.string-db.org/newstring_cgi>>

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