

## Development of Spatial Analysis Computer Application

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### Abstract

' $S^3$ ' is a computer solution for Space Syntax and ERAM. This package provides two different applications, ' $S^3$  Axial Analyzer' for the Axial Map and ' $S^3$  Convex Analyzer' for the Convex map.

The features of this application are as follows; it runs on MS Windows; its calculating speed is very fast; it is compatible with various types of Data format; it is free to use; and the source of analyzing algorithm is open.

Axman, the most well-known program for Space Syntax, operates only on Mac OS, which has always been a problem for MS Windows users. ' $S^3$ ' was developed for MS Windows to enable more people to take advantage of Space Syntax Analysis. It has the same functional capabilities as Axman and can calculate out the indices of Space Syntax such as integration, control value and connectivity from both axial and convex map. In addition, a new model called ERAM (Eigenvector Ratio of Adjacency Matrix) was also applied to this application. ERAM theory was developed by the researchers of LAUS, Seoul Nat'l University, Korea (<http://www.space-analysis.com>). It is also based on the graph theory and adjacency matrix, and produces similar outcome value to Integration.

Its calculation time has been decreased a lot. Dijkstra algorithm was used to find the shortest path from the network connections. For the sparse matrix, linked-list structure was adapted. This approach contributed to the improvement of calculating speed remarkably.

It is based on stand-alone CAD engine (CCAD), so it is possible to draw an axial map or a convex map. Furthermore, it is fully compatible with popular data formats such as DWG, DXF and XLS. You can easily import drawings and export the results. The result data are also included in DXF as properties.

It is a freeware, so anyone can use this application for non-commercial purpose. The main source of analyzing module will be open to public for the advanced developments by the user group.