



# Geospatial Intelligence on a Graph

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I certify that I have read this thesis and that in my opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science.

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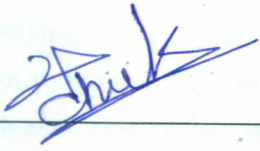
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## Declaration of originality

This is to certify that the work is entirely my own and not of any other person, unless explicitly acknowledged (including citation of published and unpublished sources). The work has not previously been submitted in any form to the Sri Lanka Institute of Information Technology or to any other institution for assessment for any other purpose.

Signed \_\_\_\_\_



Date \_\_\_\_\_

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The research implementation is consist of multiple open source free software implementations which are developed, maintained and contributed by the community. This research would not have been possible without the existing projects which are supported by open source community and contributors. Those open source products lay platforms many researches.

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## **Abstract**

### **Geospatial Intelligence on a graph**

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Geographical Information Systems (GIS) has been used over few decades across various organizations and also used by public in the day to day for scenarios such as map representations, road navigation and Global Positioning System (GPS) tracking. There are so many commercial and free GIS software is available out there for enterprises and also there are applications for personal usage which are becoming very popular with increased usage of computer and mobile devices. On the other hand with the rapid increment computer systems usage and internet usage data is getting piled in exponentially. As a result of that concepts such as big data and NoSQL came to the picture in order to manipulate those data effectively. Graph databases are one data model of NoSQL databases which delivers significant advantages such as agility, flexibility and performance. Since geographic data is naturally structured like a graph, representing a GIS data in a graph structure can be useful for spatial indexing, storage and topology in much effective way compared to other database types.

There is a gap when representing organizational on maps whereas there are limitations when it comes to details. For an instance when restaurant chain company is representing their branch outlets on a map. They have to stick to basic set of attributes allowed by mapping service provider. They cannot represent beyond that such as types of food they are selling and current availability of them in branch wise. This research will develop an



implementation by combining these two technologies GIS and graph databases in order to achieve a central Geospatial intelligence on graph which delivers benefits in the context of multiple data source integration and querying and analyzing them to generate new knowledge. In the implementation architecture a graph database stands in the back end and all the transactions are exposed and carried out by a managed Representational state transfer (REST) application programming interface (API) implementation. This API facility makes the implementation as an interoperable platform which can be integrated with many other applications.

Front end is implemented in JavaScript and mapping libraries which connect to REST API backend and loads mapping information from a map engine. From the front end map routing and graph searching can be carried out. For graph results an optimal routing algorithm will be carried to for effective results. At the end this research work outcome is a geospatial intelligence platform which is implemented on a graph database.