

Final category: Project

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Spatial Decision-Support System for Electrical Distribution Grids

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Abstract

This research expresses a suggested model for Spatial Decision Support System to demonstrate the distribution of electric system as geometric network in Geographic Information System (GIS). Spatial data of the Qabatya city as the suggested study area was collected, and prepared for GIS geodatabase and analysis.

Electric theories were implemented to calculate daily and hourly power consumption where they helped to calculate the electric current for each consumer's meter. Geometric network analysis tools were used to present the flow direction of the electric current. In order to calculate the technical losses for each cable at any phase according to its properties, resistance, length and electric current, the geometric network including all the calculated results was designed and built using a hierarchical tree structure model using Oracle database to store exported data and SQL queries to calculate the current and technical losses using backward and forward approach to express the electric flow and its distribution in the network. The results were also presented in special website. The results were exported to attribute table that was joined to the spatial data. This enrichment data helped to present them spatially on the map by producing semantic maps using symbology for the electric current for each cable. The network was separated and each phase was presented individually.

A 3D model was designed and presented to give a virtual really image of the system to help the decision makers to understand the results of the reality and to manage it smartly and making effective decisions.