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Abstract: Converting 2D Geospatial files into OpenFOAM supported 3D Stereolithography files using Free and Open Source Software Tools – Challenges and Opportunities

Manavalan, Sumit Kumar Saurav, Janakiraman
Centre for Development of Advanced Computing, Bangalore, India.

The importance of using Remote Sensing and GIS techniques in urban modelling studies are proved beyond the doubts. At the same time in the current decade urban modelling are particular about developing high resolution real time flow models in which the models such as spreading nature of Urban Heat Islands, urban air flow, urban flooding, etc are simulated through various Computational Fluid Dynamics (CFD) techniques. To achieve this the much required input data which captures the three dimensional urban buildings and other urban infrastructures of the study region is unavoidable. In general any such input data is derived in Standard Triangle Language (.STL) format which is actually native to Stereolithography file format. Generation of such three dimensional STL file covering an urban region is expensive task as it requires LIDAR survey of study area. Later this input data is converted into high quality multi space .stl mesh using COTS based CAD tools. Overall generating a high quality of mesh of urban areas is achievable through LIDAR mapping and subsequent processing of input data using COTS based CAD tools.

In line to this the proposed title, primarily explores the feasibility of generating the quality .stl files of urban areas using the geospatial file formats as primary input. Overall studies bring out the details of experiments that have been carried out in converting and integrating the widely available two dimensional geospatial data into three dimensional .stl files primarily using the Free and Open Source Software tools (FOSS). As on date with reference to meshing perspective of CFD model, any such converted file is not equal to COTS based CAD tools outcome. However efforts are on to overcome the related challenges and to generate a quality .stl file of three dimensional urban area.

The outcome of any such CFD simulation studies can be integrated with Remote Sensing and GIS techniques mainly to digitally recreate the real time urban environment at micro or at building scale level following a cost effective method. Any such integrated results of CFD, Remote Sensing and GIS model is very much useful both to understand and estimate the role and impact of urban buildings and surrounding urban infrastructures over the local to regional climatic conditions. Such results also helpful for effective planning of new urban infrastructures as well as in constructing energy efficient urban buildings.