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The Use of Remote Sensing Technique to Predict Gross Domestic Product (GDP): An Analysis of Built-Up Index and GDP in Nine Major Cities in Canada

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Abstract. City/regional authorities are responsible to design and structure the urban morphology based on the desired land-use activities. One of the key concerns regarding urban planning is to establish certain development goals, such as Gross Domestic Product (GDP). In Canada, the gross national income mainly relies on mining and manufacturing industries. In order to facilitate new city development, this study aims to utilize remote sensing and GIS techniques to assess the relationship between the industrial area and the reported GDP in nine major cities in Canada. Free archive multi-temporal Landsat TM images and land use vector data were obtained for year 2005 and 2010 during the summer season, where the socio-economic data, such as GDP, population, and total employment are obtained from Metropolitan Housing Outlook for the same duration. The Landsat TM images were first atmospherically corrected and the built-up values were computed using the Normalized Difference Built-up Index (NDBI) and Normalized Difference Vegetation Index (NDVI) from the Landsat images. The high built-up values within the industrial areas were acquired for further analysis. Finally, a correlation analysis was conducted between the GDP, Population, and Total Employment with respect to the built-up areas. Preliminary findings show that the R^2 between the percentage of built-up areas and industrial area within the corresponding city is 0.82. In addition, the R^2 between the built-up areas and GDP ranges from 0.73 to 0.78. Consistent findings are observed in the similar correlation between the built-up areas and population, as well as the built-up areas and the employment, where the R^2 is within 0.72 to 0.73. With the correlation found, we believe that results can be used as a generic indication for the federal/municipals authorities, which are aiming or target for a specific GDP with respect to the planned industrial area.

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