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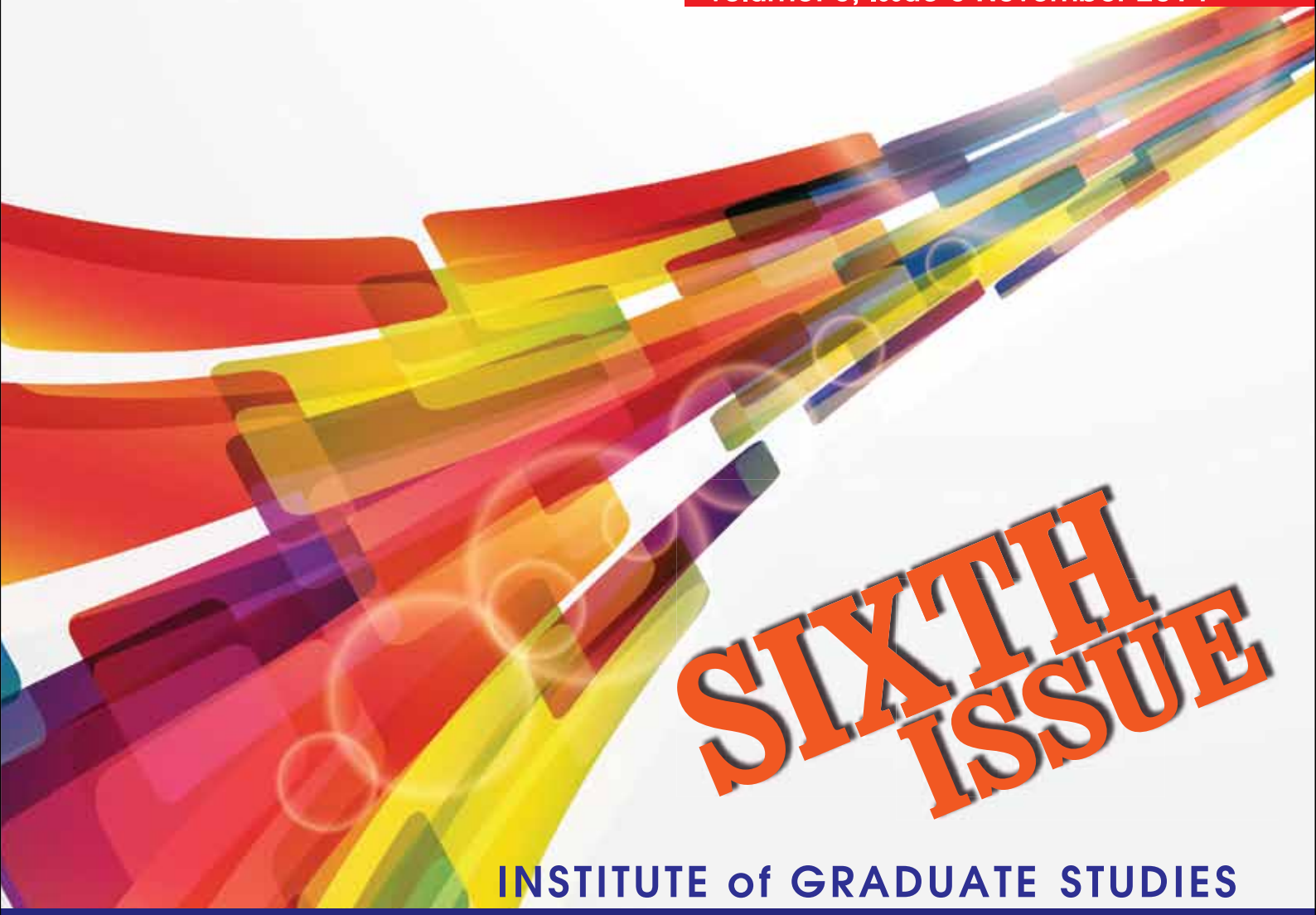

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Title :
Modelling Of Surface Air Temperature Elements : Integration Of Multiple Regression Model And Spatial Interpolation Technique

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The surface air temperature is a significant meteorological element in agricultural studies and the demand for this data has increased. Thus, satisfactory exactness is required, especially over un-sampled areas. Spatial models of surface air temperature elements were developed for the Peninsular Malaysia region. There were eight environmental variables – elevation, locations (latitude and longitude), and five nearest distances of coastline and four land use types (water bodies, forest, agriculture and built-up) – that are significant to surface air temperature elements, evaluated in this study. A multiple regression model was generated to explain the contributions of these environmental factors for each surface air temperature element. The seasonal and regional roles were also considered in the modelling process. Peninsular Malaysia experiences four seasons; namely, northeast monsoon, spring transition, southwest monsoon and autumn transition. The new regionalization of Peninsular Malaysia was delineated using a multi-step approach by integrating in-situ data for the surface air temperature elements and raster data of Geographical Information System (GIS). The developed climate region divided the area into three regions – West Coast, East Coast and the Main Range. In selecting the most appropriate model, which considered environmental, seasonal and regional factors, four categories of

models were developed for each of the three surface air temperature elements. These categories were ‘all clusters and all seasons’, w_c_s (three models), ‘all clusters and each season’, s (12 models), ‘each cluster and all seasons’, c (nine models) and ‘each cluster and each season’, c_s (36 models). In modelling of surface air temperature elements, analysis of spatial interpolation plays a vital role to produce continuous surface of discrete data, in which all un-sampled values of surface air temperature elements are able to be estimated. In implementing integration of multiple regression models and spatial interpolation technique, the monthly data of T-T’ was generated, in which T was surface air temperature values and T’ was estimated values of the 60 developed models. Interpolation analyses for 70% of T-T’ monthly data were carried out by applying the Inverse Distance Weighting (IDW) technique, since this technique has been widely used, tested and evaluated. IDW direct interpolation of monthly data for surface air temperature elements was also carried out to examine the effect of environmental factors. Cross validation analysis was conducted by using 30% of the monthly data to determine the performance of the models. Although the model category for ‘each cluster and each season’ (c_s model category) produced the lowest errors, the model category for ‘each cluster and all seasons’ (c model category) was recommended as the most appropriate model for each of the three surface air temperature elements. The statistical test to determine the differences between two groups, found that there is no significant difference between the performances of both model categories. Furthermore, the selected model category is simple, practical and user friendly. This research discovered that in addition to the environmental factor, the regional factor plays a significant role in estimating the surface air temperature elements of maximum, minimum and mean in Peninsular Malaysia.