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Comparative Analysis of Change in Vegetation in Four Districts of Punjab through Satellite Imagery, Land Use Statistics and Machine Learning

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Abstract : For many countries agriculture is still the major force driving the economy and a critically important socioeconomic sector, despite exceptional industrial development across the globe. In countries like Pakistan, this sector is considered the backbone of the economy, and most of the economic decision making revolves around agricultural outputs and data. Timely and accurate facts and figures about this vital sector hold immense significance and have serious implications for the long-term development of the economy. Therefore, any significant improvements in the statistics and other forms of data regarding agriculture sector are considered important by all policymakers. This is especially true for decision making for the betterment of crops and the agriculture sector in general. Provincial and federal agricultural departments collect data for all cash and non-cash crops and the sector, in general, every year. Traditional data collection for such a large sector i.e. agriculture, being time-consuming, prone to human error and labor-intensive, is slowly but gradually being replaced by remote sensing techniques. For this study, remotely sensed data were used for change detection (machine learning, supervised & unsupervised classification) to assess the increase or decrease in area under agriculture over the last fifteen years due to urbanization. Detailed Landsat Images for the selected agricultural districts were acquired for the year 2000 and compared to images of the same area acquired for the year 2016. Observed differences validated through detailed analysis of the areas show that there was a considerable decrease in vegetation during the last fifteen years in four major agricultural districts of the Punjab province due to urbanization (housing societies).

Keywords : change detection, area estimation, machine learning, urbanization, remote sensing
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