CIS 7030 -Geospatial Analysis

Weighting of assessment: 100% total marks

Word Limits: 4000 Words

Learning Outcomes
On successful completion of the module students should be able to: 1. Synthesis underlying geospatial concepts and apply them appropriately; 2. Critically evaluate forms of social analytics, applying appropriate techniques on social information; 3. Determine, design, prototype and implement geospatial applications; 4. Critically evaluate and identify emerging technologies and research areas relevant to geospatial analystics.

Task 01: How geospatial data science can be used for business. (10 Marks)

Propose a business plan to enhance the business using geospatial data science.

Hint - Geospatial data science can benefit businesses by providing valuable insights for market analysis, customer segmentation, location intelligence, and resource optimization. By leveraging spatial data, businesses can make informed decisions, improve operational efficiency, target the right audience, and gain a competitive advantage. To enhance a business using geospatial data science, the proposed business plan could include.

- integrating location data into customer profiling,
- conducting spatial analysis to identify target markets and optimal store locations,
- utilizing geospatial analytics for supply chain optimization, and
- incorporating location-based marketing strategies.

Note - This plan aims to leverage geospatial data science to improve decision-making, enhance customer experiences, and maximize operational efficiency for sustainable business growth.

Task 02: Descriptive explanations (Marks 20)

Discuss the following topics/techniques for conducting geospatial data analysis.

- Exploratory Spatial Data Analysis
- Spatial Statistical Models
- Geovisualization
- Machine learning for Geo-spatial data analysis

Your answer should contain the following key points. (But not limited to those.)
1. An example describes real-world usage.
2. A code snippet/s that supports your answer.

Task 03 – Predictive analytics for geospatial application (Marks 30)

"The usage of geospatial technology is extremely minimal in Sri Lanka, compared to other countries in the world." Propose a predictive model for one of the following questions.

1. Propose a complete analysis to predict natural disasters (E.g.- flooding) in Sri Lanka. (It should be a complete analysis to predict disasters in Sri Lanka. Further follow the process of gathering historical disaster data, collecting relevant spatial data (e.g., rainfall, topography), applying spatial data science techniques (e.g., spatial statistics, machine learning), and developing predictive models to assess risk and aid in decision-making for disaster management and mitigation efforts.)
2. Propose a complete analysis to identify the most optimal location for establishing a new school/hospital. This is to identify the most optimal location for establishing a new school/hospital. Hence a complete analysis must be performed, including gathering data on population density, transportation accessibility, demographic characteristics, infrastructure availability, etc. By applying spatial analysis techniques, such as suitability modeling and spatial clustering. The analysis aims to identify areas with high demand and accessibility, ensuring the new facility's effectiveness and impact on the target population. Note: Your answer must encompass the following factors. Spatial Data Collection, Spatial Data Preprocessing, Spatial Feature Extraction, Spatial Exploratory Data Analysis (ESDA), Spatial Machine Learning, Spatial Validation and Prediction, Spatial Visualization and Interpretation, Spatial Uncertainty Analysis

Task 04 – Geospatial Application (Marks 35)

Develop a predictive dashboard to predict and monitor the geo-distribution of an event/incident (E.g.: - a special event like a Book Fair) using social media data.

Hint - Your application collects and preprocesses relevant social media data, analyzes patterns and clusters, and incorporates predictive models based on historical data. The dashboard displays a map with visual markers, key metrics, and alerting mechanisms to provide real-time insights and facilitate effective monitoring of the event/incident's geographic distribution. Your dashboard should adequately implement the following aspects (but not limited to). Data Collection, Data Preprocessing, Data Analysis, Predictive Modeling, etc.

Marks distribution

Task 01_10 marks
Task 02_20 marks
Task 03_30 marks
Task 04_35 marks
Correct documentation/formatting and references – 5 Marks

ASSIGNMENT INSTRUCTIONS

- Minimum of 15 quality references (books, journal articles etc.) are expected.

- In-text and end-text referencing (Harvard referencing)

- 4,000-words (excluding reference, bibliography, appendices, code etc.)

- You cannot use materials submitted in any other unit

REPORT STRUCTURE

- Paper Size   : A4
- Word Count   : 4000 words
- Printing Margins   : LHS; RHS: 1 Inch
- Binding Margin   : ½ Inch
- Header and Footer   : 1 Inch
- Printing   : Single Sided
- Basic Font Size   : 12
- Font Style   : Arial/Times New Roman
- Presentation   : Bound Document
- All sources of information must be **referenced using "Harvard referencing"** where a **reference listing** should be included at the end of the assignment.