SIIC088
THE TIME SERIES STUDY OF THE RAINFALL INTENSITY OVER PENANG USING GIOVANNI

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Abstract:
Just like most parts of Malaysia, Penang gets a tropical climate throughout the year. That means it is warm and humid through the year with little to no variations in weather conditions. In this research, Penang is being selected as a research area. GIOVANNI system is utilized to get the information from a satellite which to empower Web-based visualization and investigation of satellite remotely detected meteorological, oceanographic, and hydrologic information sets, without users having to download data. By using GIOVANNI system method, the prediction for future event can be plot through the time series of rainfall where TOVAS is used as a sensor to measure the intensity of rainfall. The main purpose of this research is to verify the reliability of the NASA GIOVANNI system to ensure the data has a strong relationship with real data from world weather. The result from GIOVANNI system is compared with world weather data to find out the resemblance of the data. Inequality of data between GIOVANNI and TOVAS are analyses by doing cross-validation using regression analysis where R-square as an indicator to determine whether the relationship between both data are strong or weak. A high R-square of above 0.60 is required for studies in the research study for the engineering field can be reasonably predicted to some degree of accuracy research Based on the result, the data from the GIOVANNI system is inaccurate to be replaced as real data like WOLRD WEATHER because the relationship between the two data is weak where according to R-square for 2016 and 2017 are 0.4295 and 0.4743 respectively. It indicates that both data are weak for the researcher to refer because both are below than 0.6
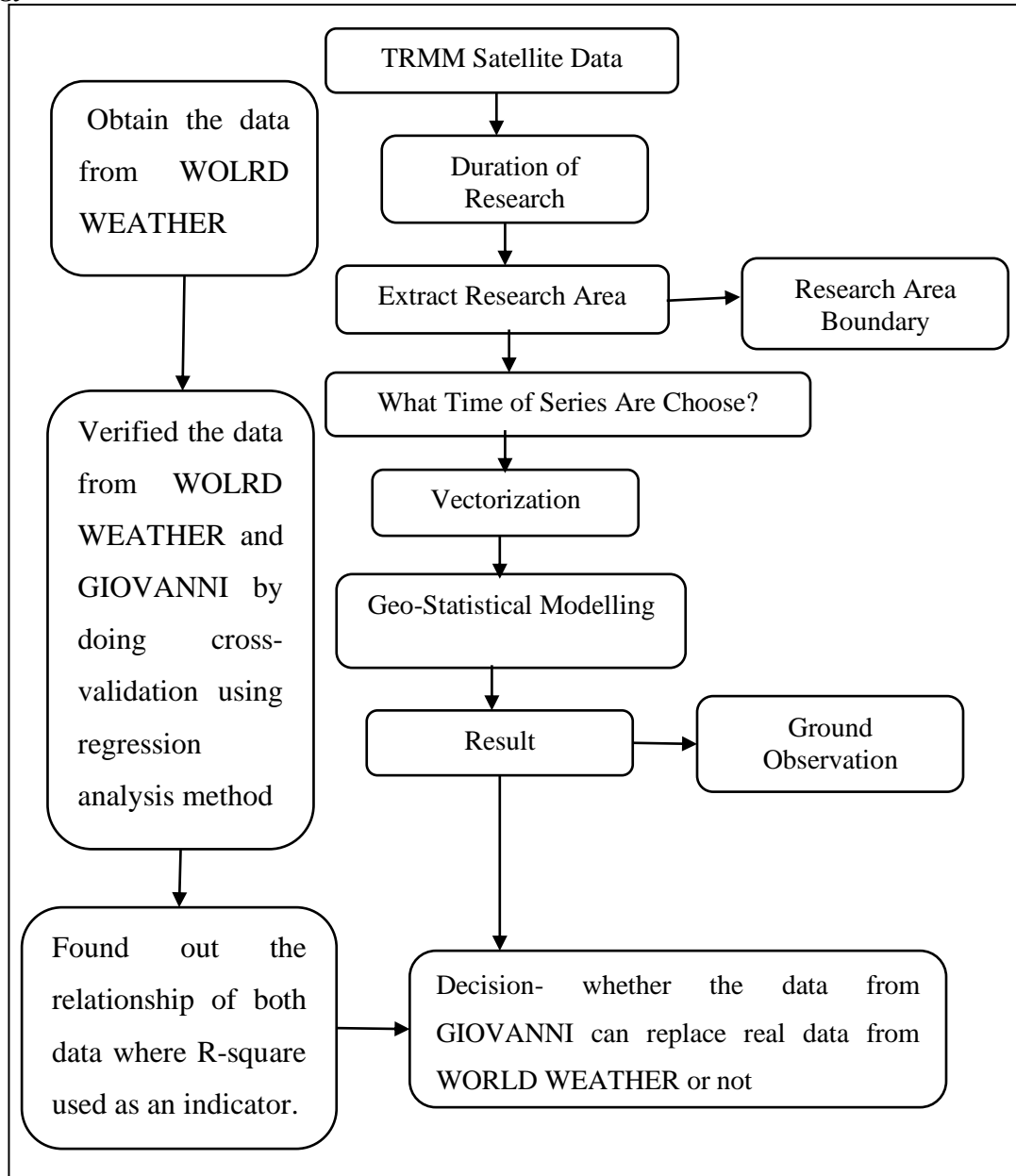
*Keywords***:**
GIOVANNI system, WORLD WEATHER, regression analysis, time series, TOVAS
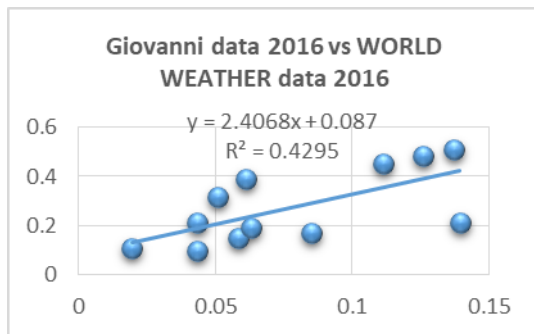
Objectives:

- To obtain the real data of rainfall and satellite data through the GIOVANNI system.

- To compare satellite data with real data from WOLRD WEATHER in order to determine the resemblance by doing cross-validation using regression analysis method.

- To verify the reliability of the NASA GIOVANNI system and therefore being able to replace with the conventional method of using real data from WOLRD WEATHER.

Methodology:

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                          ┌─────────────────────────┐
                          │   TRMM Satellite Data   │
                          └────────────┬────────────┘
  ┌──────────────────┐                 ▼
  │ Obtain the data  │      ┌─────────────────────────┐
  │ from   WOLRD     │      │    Duration of          │
  │ WEATHER          │      │    Research             │
  └────────┬─────────┘      └────────────┬────────────┘
           │                             ▼
           │             ┌───────────────────────┐      ┌──────────────────┐
           │             │ Extract Research Area │─────▶│ Research Area    │
           │             └───────────┬───────────┘      │ Boundary         │
           ▼                         ▼                  └──────────────────┘
  ┌──────────────────┐    ┌─────────────────────────────────┐
  │ Verified the data│    │ What Time of Series Are Choose? │
  │ from   WOLRD     │    └───────────────┬─────────────────┘
  │ WEATHER and      │                    ▼
  │ GIOVANNI by      │         ┌─────────────────────┐
  │ doing cross-     │         │    Vectorization    │
  │ validation using │         └──────────┬──────────┘
  │ regression       │                    ▼
  │ analysis method  │    ┌───────────────────────────┐
  └────────┬─────────┘    │ Geo-Statistical Modelling │
           │              └───────────┬───────────────┘
           │                          ▼
           │              ┌───────────────┐      ┌──────────────────┐
           │              │    Result     │─────▶│    Ground        │
           │              └───────┬───────┘      │  Observation     │
           ▼                      ▼              └──────────────────┘
  ┌──────────────────┐    ┌──────────────────────────────────────┐
  │ Found   out   the│    │ Decision-  whether  the  data  from  │
  │ relationship of  │───▶│ GIOVANNI can replace real data from  │
  │ both data where  │    │ WORLD WEATHER or not                 │
  │ R-square used as │    └──────────────────────────────────────┘
  │ an indicator.    │
  └──────────────────┘
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Results:

Linear Regression Analysis for 2016 Data
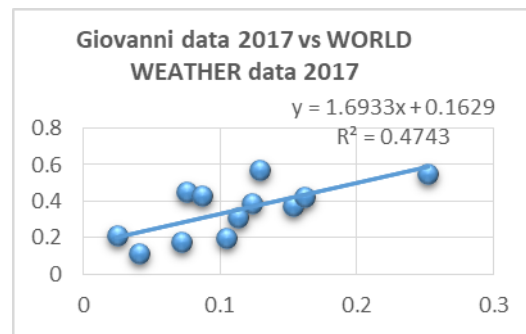
Linear Regression Analysis for 2017 Data

Conclusion:

Based on the result, the data from the GIOVANNI system is inaccurate to be replaced as real data like WOLRD WEATHER because the relationship between the two data is weak. GIOVANNI data were validated using regression analysis where R-square as an indicator to determine whether the relationship between the two data is strong or weak which is below 0.5 is considered weak data. According to R-square for 2016 and 2017 are 0.4295 and 0.4743 respectively. It indicates that both data are weak for the researcher to refer. Commonly, R-square at lower value accepted for studies in the field of arts, humanities and social sciences but the research involved with engineering field it must be above than 0.6 for reasonably predicted to some degree of accuracy. Also, several factors can affect the data from satellite using GIOVANNI systems such as signal blockage, atmospheric conditions, and others