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# DEVELOPMENT OF DIGITAL ELEVATION MODEL (DEM) BASED ON GPS STATION NETWORK IN UiTM PERAK BRANCH

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## ABSTRACT

This paper provides a unique accuracy assessment of the GPS points reference data sets to develop a Digital Elevation Model (DEM) for UiTM Perak of Seri Iskandar Campus. A Digital Elevation Model is a three-dimensional, computer generated representation of a terrain surface and usually used in Geographic Information Systems (GIS) analysis and digitally produced relief maps. The accurate vertical and their respective coordinates in which very important to create a DEM were obtained from 69 Real Time Kinematic Global Positioning System (RTK GPS) stations. These RTK GPS stations has been observed from previous survey campaign using Topcon GPS equipment set and software for processing. The GPS stations location scattered inside UiTM Perak of Seri Iskandar Campus with several of them located outside or near the campus. By using accurate coordinates and elevation based on GPS technology then all necessary check and adjustment can easily be made to produce a reliable DEM through ArcGIS 10.6 software. Lastly this Digital Elevation Model (DEM) project goals are to support student's project (Land Surveying) and helping the UiTM Perak management for sustainable planning of development in future.

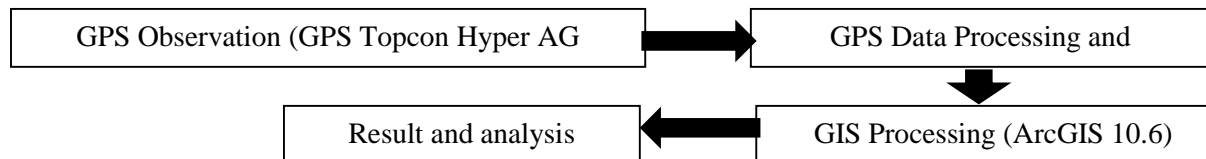
**Keywords:** global positioning system (GPS), real time kinematic (RTK), GPS station, digital elevation model (DEM), geographic information systems (GIS)

## 1. INTRODUCTION

Digital Elevation Model (DEM) is frequently used to refer to any digital representation of a topographic surface. DEM is the simplest form of digital representation of topography. DEM are used to determine terrain attributes such as elevation at any point, slope and aspect and nowadays GIS applications depend mainly on DEM. Therefore, this project goals are to develop Digital Elevation Model of UiTM Perak Branch of Seri Iskandar Campus, then to support student's project and also helping UiTM Perak management in sustainable planning of development in future.

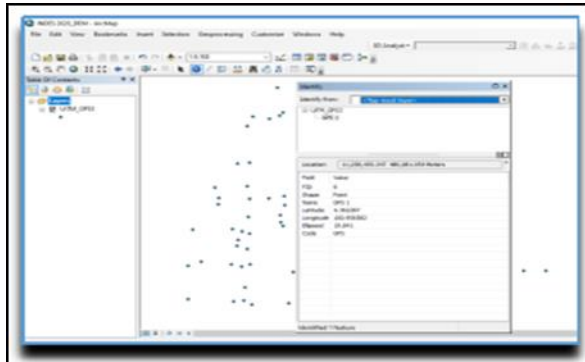
## 2. METHODOLOGY

The most important mission that has been carried out during this project was the establishment of the 69 RTK GPS control point located at UiTM Perak Branch of Seri Iskandar Campus and nearby area. The station locations were carefully been choose in order to create the accurate GPS network and next to produce the best 3D model of DEM. Figure 1 describe the phase taken to develop Digital Elevation Model (DEM).



**Figure 1.** DEM Development

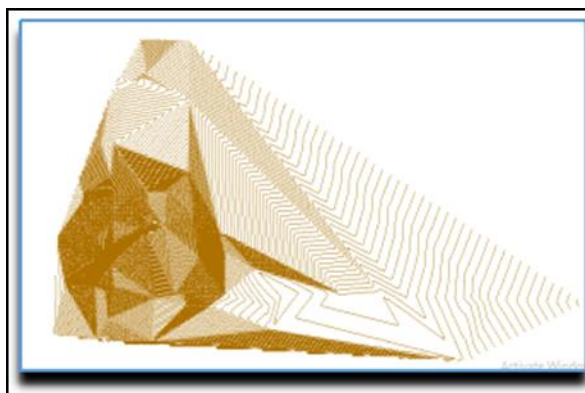
### 3. FINDING AND DISCUSSION



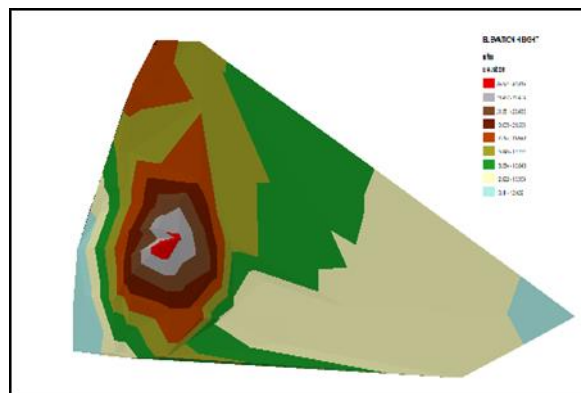
**Figure 2.** GPS Points



**Figure 3.** Overview from Satellite Images



**Figure 4.** Contour Map



**Figure 5.** Digital Elevation Model (DEM)

Figure 2 describes GPS points distributions based on WGS84 ellipsoid reference systems in study area. All the GPS data are collected in real time using RTK method and Malaysian Real-Time Kinematic GNSS Network (MyRTKnet) with typical nominal accuracy for this system is  $1-2 \text{ cm} \pm 1 \text{ ppm}$  horizontally and  $2-3 \text{ cm} \pm 1 \text{ ppm}$  vertically. Figure 3 shows the contour line overlap with actual images from satellite imagery as this is the best way to represent height on surfaces. Therefore, a contour is a line through all contiguous points with equal height values. Lastly the final product for this project can be shown in Figure 4 and Figure 5 respectively as solid contour map generated and also Digital Elevation Model (DEM) map of UITM Perak. There are two techniques involved during GIS data processing, which are generating contour lines from GPS data and generating DEM from contour lines. The contour was set out 0.1-meter interval and the DEM using the equal interval method in order to reclassify the data. Digital Elevation

Model (DEM) is a digital cartographic dataset in three dimensional (XYZ) coordinates and has been derived from contour lines.

Using DEM, the user can model the topographic environment to further investigate the site without access to the area. This means the usage of DEM can reduce time, lower the cost and reduce the labor capacity. DEM property also can be use with hydrologic modeling, terrain stability, soil mapping and as well as land use planning.

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Perkara di atas adalah dirujuk.

2. Pihak Perpustakaan ingin memohon kelulusan YBhg. Profesor untuk membuat imbasan (*digitize*) dan memuat naik semua jenis penerbitan di bawah UiTM Cawangan Perak melalui Repositori Institusi UiTM, PTAR.
3. Tujuan permohonan ini adalah bagi membolehkan akses yang lebih meluas oleh pengguna Perpustakaan terhadap semua bahan penerbitan UiTM melalui laman Web PTAR UiTM Cawangan Perak.

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