**DAILY ASSESSMENT FORMAT**

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| **Date:** | **03/07/2020** | **Name:** | **Prajwal Kamagethi Chakravarti P L** |
| **Course:** | **Satellite Photogrammetry and its Application** | **USN:** | **4AL17EC073** |
| **Topic:** | **Photogrammetric products from satellite stereo images** | **Semester & Section:** | **6 & B** |
| **Github Repository:** | **https://github.com/alvas-education-foundation/Prajwal-Kamagethi.git** |  |  |

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| **SESSION DETAILS**  **Session images**    **Report:**  **Image of session**  **Digital Elevation Models (DEMs) are raster files with elevation data for each raster cell. DEMs are**  **popular for calculations, manipulations and further analysis of an area, and more specifically analysis**  **based on the elevation. ArcGIS has several built-in functions that are very easy to use and will turn**  **the DEM into a derivative map.**  **There are several basic manipulations that can be done with ArcMap. This involves tools under**  **Spatial Analyst > Surface (the Spatial Analyst extension needs to be turned on in order for this to**  **work properly).**  **1. Slope: The DEM can easily be transformed into a slope map with the Slope tool (fig. 2.1). This**  **map describes the slope for each raster cell in degrees based on the elevation at each point.**  **2. Aspect: Another derivative is the aspect map (fig. 2.2). This map displays the aspect of each raster**  **cell grouped into compass directions (north, northwest, etc.).**  **3. Hillshade: This tool creates a map with a shade-effect (fig. 2.3) based on the input parameters that**  **are entered in the tool. The resulting map is easier to interpret than the original DEM, because some**  **topographic features are better visible (on small scale especially).**  **4. Curvature: The curvature map (fig. 2.4) is calculated by using the curvature tool. This basically**  **calculates the relative change in slope, could be seen as a second order DEM derivative.**  **5. Contour: Topographic contour lines can be plotted with the contour tool (fig. 2.6). Based on the**  **user defined parameters the new map will display (elevation based) contour lines.**  **6. Viewshed & Observer Points: These tools are used to calculate a (set of) positions relative to a user**  **defined (point) feature (fig. 2.7). This is useful to determine the visibility of a location.**  **7. Another useful way to display a DEM is to use the “Select attribute” feature (fig. 2.8). By inserting**  **a query and selecting a threshold, it is possible to select certain elevations on the map and display the**  **location of these points.**  **8. If you want to go a step further, maybe in order to classify the DEM based on elevation, you could**  **use the reclassify tool (fig. 2.9). With the reclassified map it is possible to do a raster calculation in**  **order to calculate a function for each raster cell (with each variable having its own map with**  **values).Other possibilities with a DEM include interpolations. With certain tools it is possible to**  **calculate unknown values based on known values that surround these unknown values. There are**  **several ways to interpolate. It is also possible to convert the raster DEM to a vector map, and use**  **vector related manipulations. This will however decrease the quality of the elevation data.The 3D**  **Analyst tool can also be used to make a topographic profile of a section line in the DEM. This line**  **can be drawn with the 3D analyst tool, and the profile can be made or customized with this tool as**  **well.**  **Methods**  **If the aim of the survey is landscape characterization in order to monitor changes over time, the outcome**  **of any image elaboration step**  **–**  **georeferencing, image matching, DEM extraction and morphometrical**  **feature extraction**  **–**  **should be subjected to critical**  **analysis.**  **Georeferencing**  **For geomorphological purposes, the image georeferencing phase is of primary importance. The**  **georeferencing accuracy of high**  **resolution satellite imagery is not a function of spatial resolution alone,**  **as it is also dependent upon r**  **adiometric image quality, satellite platform attitude and the precision of the**  **GCPs survey. The most frequently used georeferencing algorithms are based on rigorous models or on**  **use of RPFs.**  **In this work, we have tested the physical model embedded within t**  **he software Geomatica (called**  **“Toutin’s model”), the physical one embedded in Socet Set (called “rigorous simultaneous”) and the**  **RPF model embedded in Geomatica (called “Rational Function”).**  **The software user’s guides suggest using only a few points (from**  **6 to 10 for Geomatica, even less for**  **Socet) to geo**  **reference the image if the rigorous model is used. This is why we used only a small**  **number of points as GCPs. The remaining were used as check points (CPs) for testing the accuracy of**  **the output (e.g. to e**  **valuate the difference between the value measured on the terrain and that measured**  **on the georeferenced image).**  **In order to georeference the image, we run a NRTK GPS surveying campaign. To obtain a homogeneous**  **distribution of well**  **“matched” points, control**  **points were chosen in close proximity to the nodes of a**  **regular grid; grid spacing was fixed while bearing in mind the number of points required for image**  **georeferencing, which depends on the type of mathematical transformation used. The grid was overlaid**  **onto the image and the GCPs position was selected nearby these nodes taking care of choosing “stable”**  **details clearly visible on the image, such as artifacts or natural objects (**  **Figure 2**  **, left panel). Due to the**  **presence of many mountainous districts, devoid of any stable points that can be easily identified on the**  **image, in some areas, there are no points in correspondence of the grid nodes.**  **Figure 2.**  **Regular gri**  **ds have been drawn on the image to obtain a homogeneous distribution of well**  **-**  **“matched” points. Control points have been chosen in close proximity of the nodes of the grid. Green**  **circles indicate areas on the images that are close to visible control points,**  **yellow triangles indicate**  **“bad” points with issue of collimation (since they are located in shady areas of the image), red squares**  **are on the location of grid nodes where it was not possible to find a point to collimate (mountain areas**  **and/or without arti**  **facts). Left panel: GGCPs; right panel: MGCPs. DATUM is ETRS89, frame ETRF00.** |