ViewField to Height at GDEM – Technical Documentation
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Overview

This document provides a clear explanation of the " ViewField to Height at GDEM"
application implemented using Qt 4.8.6. The tool loads a Digital Elevation Model (DEM),
visualizes terrain height as a grayscale image, and allows the user to compute height
statistics within a defined ViewField. The system demonstrates how camera or sensor
geometry relates to elevation sampled from a GDEM dataset.

Key Features
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1. Load DEM data from ASCII grid files.
2. Display DEM visually in grayscale using QGraphicsView.
3. Define a ViewField by:
- Center (row, column)
- Radius (cell units)
- Field of View (degrees)
- Camera height (meters)
4. Compute:
- Minimum height
- Maximum height
- Average height
- Number of DEM cells inside ViewField
5. Overlay a red circular ViewField on the DEM visualization.

DEM Format

DEM files use the following ASCII structure:

rows cols
h11 h12 h13 ... h1N
h21 h22 h23 ... h2N
...
hM1 hM2 hM3 ... hMN

Qt Application Structure

Files included:

- ViewFieldGDem.pro – Qt project file
- main.cpp – App entry point
- mainwindow.h/.cpp – UI and main logic
- demmodel.h/.cpp – DEM loader and data storage
- sample_dem.txt – sample dataset
- README.txt – instructions

How the ViewField Computation Works

The ViewField is interpreted as a circular region on the DEM grid.
For each DEM cell inside the radius:

- Its height is extracted.
- Min/Max/Avg are calculated.
- Optional FOV-based footprint estimation is shown.

Rendering Logic

The DEM is converted to a grayscale QImage using min/max normalization.
Pixels are scaled by 4× for visual clarity.

Future Enhancements

- Switch from ASCII DEM to ASTER GDEM using GDAL.
- Implement real camera projection geometry.
- Export results to CSV or shapefile.
- Add 3D visualization using QGLWidget.

This document corresponds to the provided Qt 4.8.6 project source code bundle.