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## Interactive Structural Analysis of Virtual Geological Outcrops

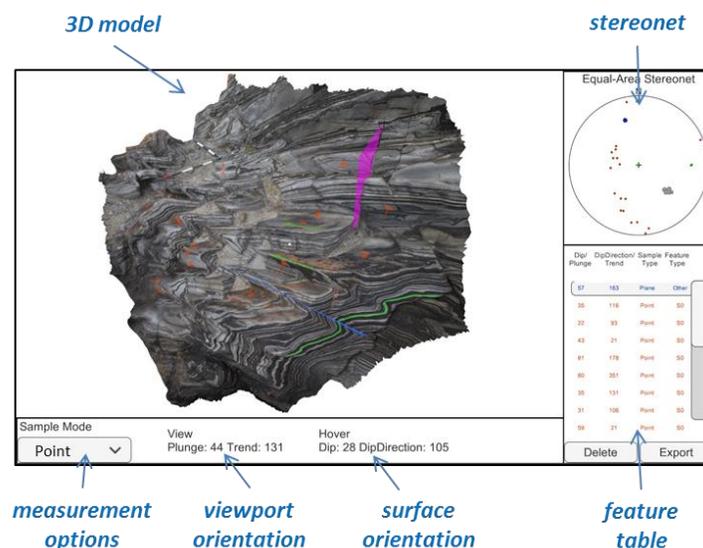
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Digital photogrammetry, based on 'structure from motion' algorithms, is a cost effective method for generating fully coordinated, photo-realistic, texture-rendered, 3D virtual models of geological outcrops. These models can capture all the geometric and textural features of a real outcrop and provide excellent resources for geological education, research and public outreach.

We present a new, free application that allows intuitive, interactive, general structural analysis of 3D virtual models. This application has been developed as part of the AusGeol project which provides a virtual library of Australia's geology and accompanying educational resources. The application runs on Windows and Macintosh computers and can be downloaded from the AusGeol website ([www.ausgeol.org](http://www.ausgeol.org)).

The software has been developed using the Unity game engine and currently accepts input models as Google KMZ files from the AgiSoft Photoscan photogrammetry software. The main application interface (Figure 1) has a model viewport in which the 3D model is manipulated and measurements are conducted using the mouse cursor. The orientation of a planar feature on the external surface of the model can be measured with a single mouse click using several interpolation or smoothing algorithms. Planar features that intersect the model surface are recorded by digitising multiple points along the surface trace of the structure. The application provides visual feedback on the fit of the plane to the digitised points and also tests for co-linearity of the input points. Linear features are measured by digitising two points on the model surface. Options for 3D annotation are also provided. Annotation modes include drawing lines and curves on the model surface and the ability to attach text labels to the model.



**Figure 1.** *The structural analysis interface displays linked model, stereonet and feature table panes. Structural features and annotation are shown on the surface of the model.*

Structural measurements on the model are automatically plotted in the stereonet pane and displayed in the feature table. Data are linked, so that selection of a measurement in any pane automatically highlights the corresponding feature in the other panes.

Structural data can be exported to ASCII text files in CSV format for input into external applications. All measurements, annotations and display parameters can be saved in a session file that is stored in XML format. Session files provide a mechanism for easy exchange of structural interpretations between students and educators or between researchers.

