

EXTRACTING INFORMATION FROM DIGITAL IMAGES OF CORE

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ABSTRACT

Quantitative image analysis is becoming routine as digital images gain popularity. The trend seems to be accelerating each year, as the cost to create, store, and process digital images declines.

Digital images of core were captured in white, ultraviolet, and infrared light using a video camera or scanner. The ultraviolet and infrared images can be used to detect hydrocarbons, discriminate mineralogy, and to observe features of a rock through black crude oil covering its surface.

Digital images can be easily manipulated for presentation alongside conventional wireline logs and borehole images. Such presentations enhance the usefulness of both the wireline and core data. They can help the user orient the core, compensate for missing or lost sections, and rapidly calibrate logs.

Our image processing system can perform color discrimination of features in core images. It can be used to quantify the amounts of sand and shale. With our system, the user simply clicks one at a time on a handful of pixels in the image whose colors represent the range of colors exhibited by the feature of interest (e.g. tan-fluorescing oil sands). This trains the computer to recognize these selected colors and all similar colors.

This training process is implicit rather than explicit. Unlike other systems, the user doesn't have to worry about setting acceptance windows for red, green, and blue intensities. The user simply picks out the representative colors visually and lets the computer handle the mathematical details.

In this way, one can quantify various features such as percent fluorescing oil sands, number of sand or shale laminae, thicknesses of these laminae, and bedding angles to improve reservoir description and correlation to logs. Computer processing of images also relieves geologists of the tedious and often inaccurate task of trying to manually quantify these features.