Automating Raster Well Log Preparation with Python: Depth Registration, Straightening, and Track Identification

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Abstract

Raster well logs require manual processing prior to utilization for interpretation by a geologist. While logs vary in format by vendor they generally share a similar format of header, left track, depth track, right track, and footer. By locating these components of the log within the raster image we can automate the normally manual workflows of depth registration, straightening, and track identification.

This study uses the mean values across the x and y axes of the image array to locate the log components and classify log run from header sections. Within log run sections the locations of the left edge of the   left track can be aligned with dynamic time warping (DTW) with the offset adjusted thereby straightening the log image. By identifying the location of the depth tract this portion of the image can be cropped, segmented, and enlarged to increase the accuracy of digitization of depths with optical character recognition (OCR). Log curve names and scales for the left and right tract are identified with a similar process of cropping the tract header, digitizing the text with OCR, and searching an alias list with a Levenshtein Distance string match. This information can then be used to construct a depth registration file for the log image which also identifies separate logging runs and the log scale. Log tracks referenced within the raster images can be used by geologic interpretation software to show a desired log tract rather than the whole log width.

Preliminary results using array mean values across each axis have yielded significant progress to automating the workflow compared to previous attempts. Work continues to improve the classification of log and header tracts on logs with a higher percentage of black pixels such as concrete bond logs. This automated workflow has wide application for making large log datasets usable without manually straightening and depth registering them prior to use.

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