

Federal Bureau of Investigation (FBI)
Universal Latent Workstation (ULW)
LQMetrics User Guide

The FBI's Latent Quality Metrics (LQMetrics) Software automatically assesses the quality of latent fingerprint images. LQMetrics has been integrated for use into ULW 6.6.0 Latent Editor and is tailored specifically for searching the Next Generation Identification (NGI) System. It is not intended to replace the latent print examiner's quality assessment, but is meant to complement that process.

(Note: LQMetrics is limited to latent fingerprints; a future version is expected to address latent palms.)

A. How to Run LQMetrics

1. Optionally draw a Region of Interest (ROI) around the friction ridge in an impression. If an ROI is not drawn, LQMetrics will attempt to automatically estimate an ROI.
2. In the **Features Toolbar**, **Latent Info** section, click on the **Latent Quality** button (figure 1). A **Calculating Quality Metrics** message window may briefly appear.
3. Once calculated, the Latent Quality score appears on the **Latent Quality** button (figure 2).

Figure 1: Latent Quality Button – Before

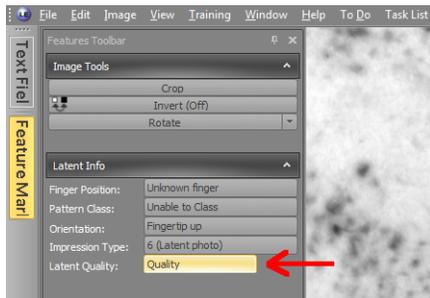
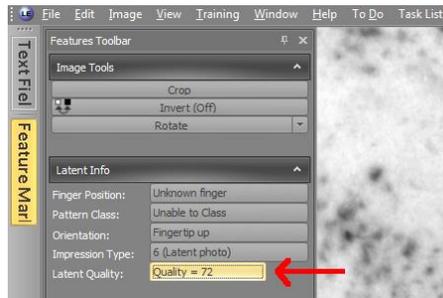


Figure 2: Latent Quality Button - After



B. How to Interpret the Latent Quality Score

The Latent Quality score ranges from 0 to 100 and indicates the predicted probability that an image-only search (optionally with a drawn ROI) would return the mate on the candidate list (assuming the mate is in the gallery, of sufficient quality, and has sufficient overlap with the latent). For example, if the score is 80, there is a predicted 80% chance a search would return the mate.

LQMetrics scores were also compared against information assessments of “good”, “bad”, and “ugly”. Most latents that were informally assessed by latent examiners as “good” resulted in LQMetrics values from 65 to 90, “bad” from 45 to 65, and “ugly” from 20 to 45.

C. A Note on the ROI

If an ROI is drawn, it is not recommended to repeatedly adjust the ROI and calculate the Latent Quality score after each adjustment in order to find an ROI that increases the Latent Quality score. Instead, draw the ROI as if submitting a search and

then calculate the Latent Quality score once. This Latent Quality score is likely to be more indicative of whether the mate would be returned on the candidate list than the Latent Quality score from the repeatedly adjusted ROI process.

D. A Note on the Clarity Map

As part of its processing, LQMetrics calculates a clarity map that characterizes the local ridge flow¹. It is not necessary to see the clarity map in order to run LQMetrics or to view the scores it produces. However, if interested, to make the clarity map visible as an overlay on the latent image, change the following settings:

1. In the **Features Toolbar**, **Feature Set** drop down menu, select a feature set that supports Extended Feature Set (EFS).
2. In the **Show Features Toolbar**, select the **Show All** radio button.

E. How to View the Detailed Quality Metrics

The two equivalent ways to view the Detailed Quality Metrics are:

1. Right click the **Latent Quality** button, and then select **Detailed Quality Metrics** (figure 3).
2. Select **Detailed Quality Metrics** from the **Image** menu (figure 4).

Figure 3: Button, Detailed Quality Metrics

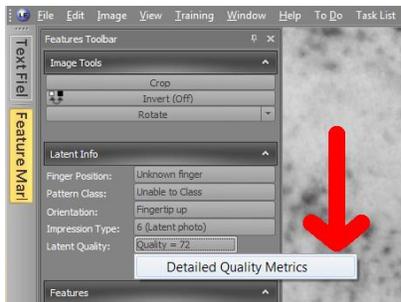
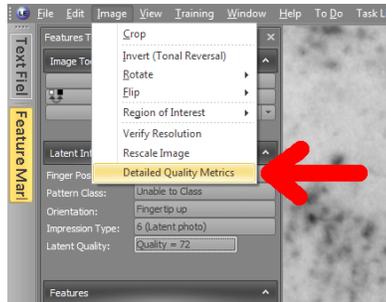


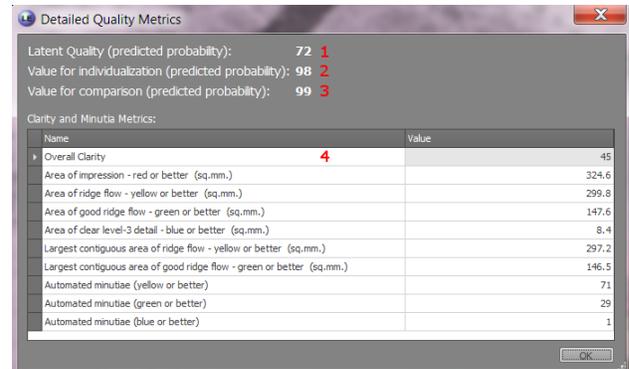
Figure 4: Image Menu, Detailed Quality Metrics



F. How to Interpret the Detailed Quality Metrics

The first section at the top of the **Detailed Quality Metrics** window contains three scores (labeled 1-3 in figure 5): the Latent Quality score (described previously) and predicted probabilities that an examiner would assess the latent as of "Value for individualization" (VID) or as of "Value for comparison" (VCMP). A latent is VID if an examiner would assess it to have sufficient quality for individualization. Similarly, a latent is VCMP if an examiner would assess it to have sufficient quality for individualization or for exclusion.

Figure 5: Detailed Quality Metrics



¹ For a description of the clarity levels, see page 134 of Wing, B. (2011). ANSI/NIST-ITL 1-2011. Information Technology: American National Standard for Information Systems Data Format for the Interchange of Fingerprint, Facial & Other Biometric Information. http://biometrics.nist.gov/cs_links/standard/AN_ANSI_1-2011_standard.pdf

The VID and VCMP probabilities have similar interpretations to the Latent Quality score. For example, a VID score of 75 means there is a predicted 75% chance an examiner would assess the latent to have sufficient quality for individualization.

Below the three scores is the **Clarity and Minutia Metrics** table. The **Overall Clarity** score² (labeled 4 in figure 5) is a measure of the level and quantity of friction ridge detail in the impression. Although it is not a probability, it also ranges from 0 to 100. Larger values indicate a greater level or quantity of friction ridge detail. The other values in the table are automated estimates of area sizes and minutia counts by clarity level.

² Hicklin, R. A., Buscaglia, J., & Roberts, M. A. (2013). Assessing the clarity of friction ridge impressions. *Forensic science international*, 226(1), 106-117.