Signal Quality Index (SQI) Explained Simply

1. PSQI (Perfusion Signal Quality Index)

How strong is the heartbeat wave?

Formula: (Max - Min) / Mean of signal

High PSQI = strong, clear pulse waves = good quality.

2. SSQI (Skewness)

Is the wave lopsided?

Formula: Average of ((x - mean)/std)^3

Lopsided signals may mean corruption.

3. KSQI (Kurtosis)

Are the waves pointy or flat?

Formula: Average of ((x - mean)/std)^4

High = sharper peaks = better signal.

4. ESQI (Entropy)

How random is the signal?

Formula: Sum of x[n]^2 * log(x[n]^2)

Higher entropy = more randomness.

5. ZSQI (Zero Crossing)

How many times does signal cross zero?

Too many crossings = noisy signal.

6. NSQI (Signal-to-Noise Ratio)

Is signal stronger than noise?

Formula: Var(signal) / Var(noise)

Higher ratio = clearer signal.

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7. MSQI (Matching Peaks)

Do two detectors agree on peaks?

Formula: Matches / Total by Detector A

Better match = better beat detection.

8. RSQI (Relative Power)

Is most energy in heartbeat band?

Formula: Power in 1-2.25 Hz / Power in 0-8 Hz

Higher RSQI = good frequency content.