

Feature Extraction

Texture analysis

GLCM, LBP patterns

Shape descriptors

Area, perimeter, circularity, moments

Intensity statistics

Mean, std, min/max, histogram metrics

Haralick features

14 texture features from GLCM

Radiomics

High-throughput feature extraction

GLCM (Gray Level Co-occurrence)

Image:  GLCM Matrix:

4	2	1
2	3	2
1	2	0

Captures texture patterns

LBP (Local Binary Pattern)

Binary:  Pattern:

$$11011100_2 = 220$$

Rotation invariant texture

Shape Descriptors



- Area = πab
- Perimeter $\approx 2\pi\sqrt{(a^2+b^2)}$
- Circularity = $4\pi A/P^2$
- Eccentricity = $\sqrt{1-b^2/a^2}$
- Solidity = A/A_{convex}
- Hu moments (7)

Haralick Features (from GLCM)

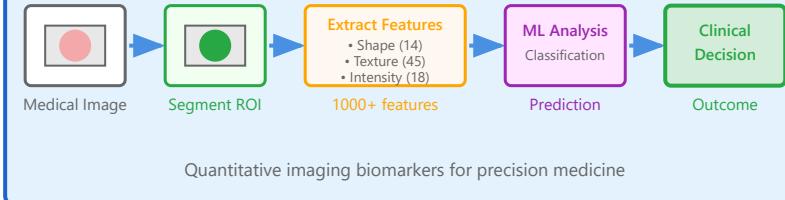
Statistical: Correlation:

- Energy (uniformity)
- Entropy (randomness)
- Contrast (local variations)
- Homogeneity
- Correlation
- Dissimilarity

Higher-order:

- Cluster shade
- Cluster prominence
- IMC1, IMC2
- Max probability

Radiomics Pipeline



Quantitative imaging biomarkers for precision medicine