Appendix

On-line Table 1: First-order textural features[a]

First-Order Texture Feature	Formula
MGL	$MGL = \frac{1}{N_p} \sum_{ij} g(i, j)$
VGL	$VGL = \frac{1}{N_p} \sum_{ij} (g(i, j) - MGL)^2$
Gradient calculations: given a neighborhood of pixels, eg,	
	A B C D E F G H I J K L M N O P Q R S T U V W X Y
Absolute gradient value [ABSV(*i, j*)]	$ABSV(i, j) = \sqrt{(W - C)^2 + (O - K)^2}$
MGR	$MGR = \frac{1}{N_p} \sum_{i,j} ABSV(i, j)$
VGR	$VGR = \frac{1}{N_p} \sum_{i,j} (ABSV(i, j) - MGR)^2$

[a] Where $g(i, j)$ indicates the gray-level intensity of pixel (i, j); N_p, the number of pixels; and N_g, the number of distinct gray levels[9] (hypothetical gradient example adapted from Lerski et al.[17]).

On-line Table 2: GLCM textural features[a]	
GLCM Texture Feature	Formula
f_1 Angular second moment	$f_1 = \sum_{i=1}^{N_g} \sum_{j=1}^{N_g} \left(\frac{P(i,j)}{R} \right)^2$
f_2 Contrast	$f_2 = \sum_{n=0}^{N_g-1} n^2 \sum_{\substack{i=1 \\ \lvert i-j \rvert = n}}^{N_g} \sum_{j=1}^{N_g} \left(\frac{P(i,j)}{R} \right)$
f_3 Correlation	$f_3 = \frac{\sum_{i=1}^{N_g} \sum_{j=1}^{N_g} (ijP(i,j)/R) - \mu_x \mu_y}{\sigma_x \sigma_y}$
f_4 Sum of squares: variance	$f_4 = \sum_{j=1}^{N_g} \sum_{j=1}^{N_g} (i-\mu)^2 \left(\frac{P(i,j)}{R} \right)$
f_5 Inverse difference moment	$f_5 = \sum_{i=1}^{N_g} \sum_{j=1}^{N_g} \frac{1}{1+(i-j)^2} \left(\frac{P(i,j)}{R} \right)$
f_6 Sum average	$f_6 = \sum_{i=2}^{2N_g} i p_{x+y}(i)$
f_7 Sum variance	$f_7 = \sum_{i=2}^{2N_g} (1-f_8)^2 P_{x+y}(i)$
f_8 Sum entropy	$f_8 = -\sum_{i=2}^{2N_g} p_{x+y}(i) \log\{p_{x+y}(i)\}$
f_9 Entropy	$f_9 = -\sum_{i=1}^{N_g} \sum_{j=1}^{N_g} \frac{P(i,j)}{R} \log\left(\frac{P(i,j)}{R} \right)$
f_{10} Difference variance	Variance of P_{x-y}
f_{11} Difference entropy	$f_{11} = -\sum_{i=0}^{N_{g-1}} p_{x-y}(i) \log\{p_{x-y}(i)\}$
$f_{12} + f_{13}$ Information measures of correlation	$HXY = -\sum_{i=1}^{N_g} \sum_{j=1}^{N_g} \frac{P(i,j)}{R} \log\left(\frac{P(i,j)}{R} \right)$
Where HX and HY are entropies of p_x and p_y and:	$HXY1 = -\sum_{i=1}^{N_g} \sum_{j=1}^{N_g} \frac{P(i,j)}{R} \log\{p_x(i) p_y(j)\}$
	$HXY2 = -\sum_{i=1}^{N_g} \sum_{j=1}^{N_g} p_x(i) p_y(j) \log\{p_x(i) p_y(j)\}$
	$f_{12} = \frac{HXY - HXY1}{\max\{HX, HY\}}$
such that:	$f_{13} = (1 - \exp[-2.0(HXY2 - HXY)])^{1/2}$
f_{14} Maximal correlation coefficient	(second largest eigenvalue of Q)$^{1/2}$, where $Q(i,j) = \sum_k \frac{p(i,k)p(j,k)}{p_x(i)p_y(k)}$

[a] Where $P(i, j)$ indicates the joint probability of 2 pixels having particular co-occurring values I; $j = 1, 2, \ldots, N_g$; R indicates the total number of neighboring pixel pairs; and N_g, the number of distinct gray levels. μ_x, μ_y, σ_x, and σ_y indicate means and SDs of the row and column sums of the co-occurrence matrix.[9]

On-line Table 3: RLM textural features[a]

RLM Textural Feature	Formula
RF_1 Short runs emphasis	$RF_1 = \dfrac{\sum_{i=1}^{N_g}\sum_{j=1}^{N_r}\frac{P^{(i,j)}}{j^2}}{\sum_{i=1}^{N_g}\sum_{j=1}^{N_r}P(i,j)}$
RF_2 Long runs emphasis	$RF_2 = \dfrac{\sum_{i=1}^{N_g}\sum_{j=1}^{N_r}j^2P(i,j)}{\sum_{i=1}^{N_g}\sum_{j=1}^{N_r}P(i,j)}$
RF_3 Gray-level nonuniformity	$RF_3 = \dfrac{\sum_{i=1}^{N_g}\left(\sum_{j=1}^{N_r}P(i,j)\right)^2}{\sum_{i=1}^{N_g}\sum_{j=1}^{N_r}P(i,j)}$
RF_4 Run-length nonuniformity	$RF_4 = \dfrac{\sum_{j=1}^{N_g}\left(\sum_{i=1}^{N_r}P(i,j)\right)^2}{\sum_{i=1}^{N_g}\sum_{j=1}^{N_r}P(i,j)}$
RF_5 Run percentage	$RF_5 = \sum_{i=1}^{N_g}\sum_{j=1}^{N_r}\frac{P(i,j)}{N_p}$

[a] Where $P(i, j)$ indicates the number of gray-level runs j pixels long for a given gray level; $i = 1, 2, \ldots, N_g$; N_p, the number of pixels; and N_g, the number of distinct gray levels.[13]