**Description of texture properties - GLCM**

According to the equations (HALL-BEYER, 2017; ALAZAWI, SHATI and ABBAS, 2019):

|  |  |  |
| --- | --- | --- |
|  |  | (1) |
|  |  | (2) |
|  |  | (3) |
|  |  | (4) |
|  |  | (5) |
|  |  | (6) |

Where:

and are defined as position between row and column of the matrix, is the GLCM matrix [i, j, d, Ɵ]. The result of the properties is an array 2-d Property [d, Ɵ], with property value at the distance d and angle Ɵ.

(Eq. 1) is the sum of the measurement related to the distance of the GLCM diagonal, allocating specific weights. They receive weight 0 when and are equal, weight 1 when the difference between and is equal to 1, weight 4 when the difference between and is 2 and thus increase exponentially as the difference between and increases.

(Eq. 2) follows the Contrast calculation pattern by modifying the weight value in a linear way.

(Eq. 3) acts in order to weight the values by the inverse of the Contrast weights, that is, the weights decrease exponentially in relation to the GLCM diagonal. Its value ranges from 0 to 1.

(Eq. 4) calculate the sum of the weight measurement of each position and . High values for ASM indicate high pixel ordering with the same values.

(Eq. 5) is calculated using the square root of .

or Linear Correlation (Eq. 6) is the sum of the linear dependence measure of the gray level values of the GLCM matrix with the closest neighbors. For a symmetric matrix, the correlation value is equivalent to variance (σ²).

References

ALAZAWI, S. A., SHATI, N. M., ABBAS, A. H., 2019. Texture features extraction based on GLCM for face retrieval system. Periodicals of Engineering and Natural Sciences, 7, 3. http://dx.doi.org/10.21533/pen.v7i3.787.

HALL-BEYER, M., 2017. GLCM Texture: A Tutorial v. 3.0. University of Calgary. http://dx.doi.org/10.11575/PRISM/33280.