Optical system to compute intensity moments for gait description

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ABSTRACT

In this work, an optical system based on intensity moments is used for human gait analysis. Histories moment were obtained from the processing of images of the MoBo database. The images were obtained form six cameras and four acquisition conditions. The gait descriptors are the input of an artificial Neural network for classification.
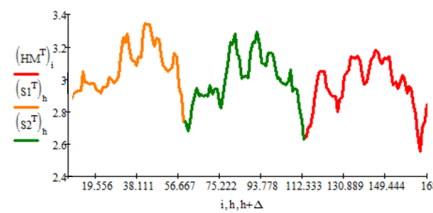
INTENSITY MOMENTS

$$m_{pq} = \frac{1}{(-i2\pi)^{p+q}} \left[\left(\frac{\partial}{\partial u}\right)^p \left(\frac{\partial}{\partial v}\right)^q F(u,v) \right]_{u=v=0}$$
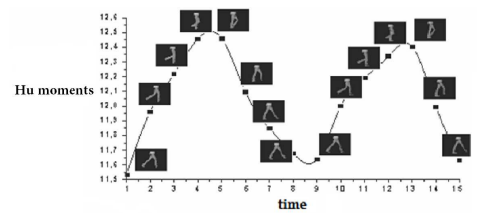
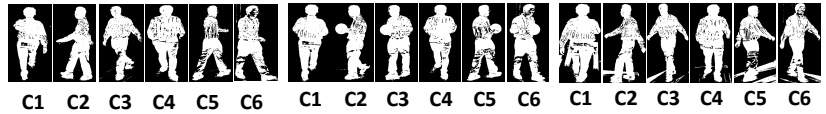## OPTICAL SYSTEM
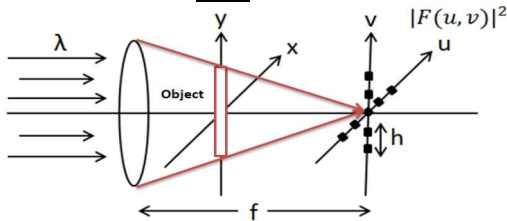
RESULTS OPTICAL SYSTEM

BIOMETRIC SIGNATURE

GEOMETRIC MOMENTS

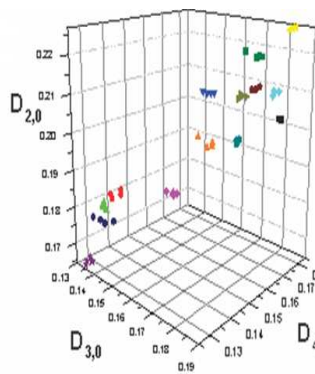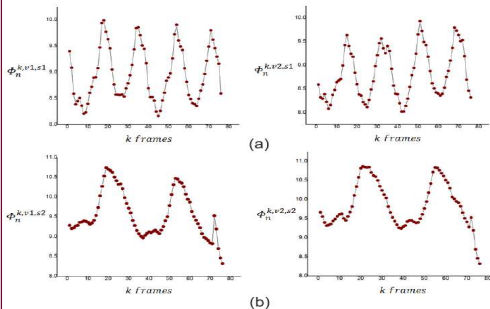$$m_{pq} = \sum_x^{N-1} \sum_y^{M-1} (x-X)^p (y-Y)^q f(x,y)$$

MoBo DATA BASE

C1 C2 C3 C4 C5 C6   C1 C2 C3 C4 C5 C6   C1 C2 C3 C4 C5 C6
Slow Walk
Fast Walk   **Ball**   **Incline**

DIGITAL RESULTS

NEURAL NETWORK

NEURON i

$$y_i = f\left(\sum w_{ij}x_j - \theta_i\right)$$
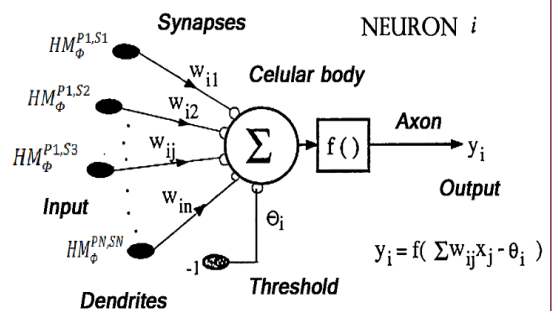
RESULTS NEURAL NETWORK

	Slow Walking	Fast Walking	Ball Walking	Incline Walking
Camera 1	95.5%	91.1%	97.7%	91.1%
Camera 2	86.6%	93.3%	97.7%	91.1%
Camera 3	97.7%	91.1%	100%	100%

CONCLUSIONES/CONCLUSIONS

- Geometric moments were computed from series of digital images by an optical system based on the Fourier Transform.
- The moments history shows clearly the periodicity of the gait.
- We used the MoBo database to test classificacion results using an ANN (software WEKA).
- The best classification results are obtained when using the camera 3 for most of the cases.

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