Título Extended LBP Operator to Characterize Event-Address Representation Connectivity

Tipo de Producto Ponencia resumen

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Publicado en: Iberoamerican Congress On Pattern Recognition

Código del Proyecto y Título del Proyecto

P16T01 - Segmentación de información visual a partir de cámaras retinianas: Aplicación a Robótica Móvil

Responsable del Proyecto

Pablo Negri

Línea

Matemáticas e informática

Área Temática

Ciencias biológicas

Fecha

Noviembre 2016

INTEC
Instituto de Tecnología

UADE FUNDACIÓN UADE

Extended LBP Operator to Characterize Event-Address Representation Connectivity

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Abstract. Address-Event Representation is a flowering technology that can change the visual perception of the computer vision world. This paper proposes a methodology to associate the input data from this kind of sensors. A new descriptor computed using an extended LBP operator seeks to characterize the connectivity of the asynchronous incoming events in a two dimensional space. Those features can be organized on histograms and combined with others descriptors, as histograms of oriented events. They can be the input of traditional classifiers to detect or recognize objects from the scene.

1 Introduction

A new paradigm for visual sensing was introduced in 2006 as the first Event-Driven Dynamic Vision Sensor (DVS) [7]. This sensor is inspired by the asynchronous Address Event Representation (AER), first introduced by Mahowald [9], and by the Kramer's transient detector concept [6]. It consists of a grid of pixels (also called "silicon retinae"), capturing changes of illumination at the focal plane. When a such event occurs, it is transmitted as an information tuple, indicating the pixel position on the grid, the time stamp and the polarity of the event. Thus, this sensor transmits a continuous flow of new events, instead of a 2D frame. This kind of vision sensor is then considered as "frameless".

The DVS visual data representation launch a new branch on the computer vision field. Traditional methodologies have to be modified in order to exploit the new information, and a new theoretical model must be developed to adapt this paradigm. Recent works tackle Visual Flow [1], Corner Detection [3] and Object Recognition [15,14] using the asynchronous temporal flow.

If the DVS camera is fixed, the images have the particularity that only moving objects are captured. In fact, the generated events correspond to the edges of this object. Static objects do not generate events. In some way, the results are similar to the Movement Feature Space [12,11] which constructs a dynamic background model using the boundaries of objects. If the temporal window for learning the background modes is fixed to some milliseconds: a moving object that stops, enters automatically to the background model. This paper seeks to generate a family of features using a histogram representation of the AER data to characterize objects shape.

Publicación completa en: https://link.springer.com/chapter/10.1007/978-3-319-52277-7_30