

What is claimed is:

1. An optical flow calculation method for a computing device, comprising:

acquiring an event data flow with a predetermined duration from a Dynamic Vision Sensor (DVS), the event data flow comprising a coordinate position and a timestamp of a triggered event;

generating a timestamp matrix in accordance with the coordinate position and the timestamp of the triggered event, comprises: creating a timestamp matrix with a predetermined size, the predetermined size being determined in accordance with a size of a pixel unit array of the DVS; initializing the timestamp matrix with zero values to acquire an initialized timestamp matrix; searching the coordinate position of the triggered event in the initialized timestamp matrix; and writing the timestamp of the triggered event to the searched coordinate position to acquire the timestamp matrix;

scanning elements in the timestamp matrix in a predetermined scanning direction, so as to determine at least one intermediate point in each element in accordance with a value and a gradient of the element in the predetermined scanning direction, wherein the predetermined scanning direction is determined in accordance with a movement direction of an object in a field of view, and comprises a horizontal scanning direction, a vertical scanning direction, a perspective scanning direction and a rotational scanning direction; and

calculating a distance between adjacent intermediate points and a gradient direction, and generating an optical flow matrix in accordance with a calculation result.

2. The optical flow calculation method according to claim 1, wherein the determining the at least one intermediate point in each element in accordance with the value and the gradient of the element in the predetermined scanning direction comprises: calculating the gradient of each scanned element in accordance with the value of the scanned element one by one in the predetermined scanning direction; and determining the scanned element as the intermediate point when the value and/or gradient of the scanned element meets a predetermined condition.

3. The optical flow calculation method according to claim 2, wherein the generating the optical flow matrix in accordance with the calculation result comprises: creating an optical flow

matrix with a predetermined size; initializing the optical flow matrix with zero values to acquire an initialized optical flow matrix; searching a coordinate position of the intermediate point in the initialized optical flow matrix; and writing a value of the corresponding intermediate point to the searched coordinate position to generate the optical flow matrix.

4. The optical flow calculation method according to claim 3, wherein the determining the scanned element as the intermediate point when the value and/or gradient of the scanned element meets the predetermined condition comprises: determining the scanned element as a first intermediate point when a product of the gradient of the scanned element and a gradient of an adjacent element is smaller than zero; determining the scanned element as a second intermediate point when the value of the scanned element is not equal to zero and a value of the adjacent element is equal to zero; and marking the first intermediate point and the second intermediate point as intermediate points.

5. The optical flow calculation method according to claim 4, wherein the calculating the distance between the adjacent intermediate points and the gradient direction comprises: selecting two adjacent intermediate points without any zero point therebetween as an intermediate point pair; with respect to each intermediate point pair, calculating a distance between the two intermediate points in accordance with coordinate positions of the two intermediate points; calculating the gradient direction of the intermediate point pair and determining a gradient symbol value in accordance with the gradient direction; and determining a product of the distance between the two intermediate points in the intermediate point pair and the gradient symbol value as a value of the two intermediate points in the intermediate point pair.

6. The optical flow calculation method according to claim 5, wherein the generating the optical flow matrix in accordance with the calculation result further comprises: creating an optical flow matrix with a predetermined size; initializing the optical flow matrix with zero values to acquire an initialized optical flow matrix; searching coordinate positions of two intermediate points in an intermediate point pair in the initialized optical flow matrix; and writing a value of the two intermediate points to the searched coordinate positions of the two intermediate points and a coordinate position between the two intermediate points.

7. The optical flow calculation method according to claim 6, wherein the writing the timestamp of the triggered event to the searched coordinate position comprises, when one coordinate position corresponds to a plurality of timestamps in the event data flow, writing the timestamp in the plurality of timestamps with a maximum value to the coordinate position.

8. The optical flow calculation method according to claim 6, wherein the writing the timestamp of the triggered event to the searched coordinate position comprises, when one coordinate position corresponds to a plurality of timestamps in the event data flow, writing the timestamp in the plurality of timestamps with a minimum value to the coordinate position.

9. The optical flow calculation method according to claim 8, wherein the determining the gradient symbol value in accordance with the gradient direction comprises: when the gradient direction is greater than zero, determining that the gradient symbol value is +1; and when the gradient direction is smaller than zero, determining that the gradient symbol value is -1.

10. A computing device, comprising one or more processors, a memory, and one or more programs stored in the memory and executed by the one or more processors, wherein the one or more programs comprise instructions for implementing the optical flow calculation method according to claim 9.

11. A computer-readable storage medium storing therein one or more programs comprising instructions, wherein the instructions are executed by a computing device so as to implement the optical flow calculation method according to claim 9.