Design Assignment

SynSense AG

Computer Vision Application Engineer

October 7, 2024

Question 1: Handling flicker noise

Flicker noise caused by artificial lightning sources can degrade the image quality and event based cameras are more vulnerable to this type of artefact. This is one of the challenges in building a robust application with these sensors and severity of the effect can vary from negligible to very destructive, depending on the deployment environment and the efficiency of artefact removal algorithms.

You are asked to design and build a gesture recognition application with SynSense Speck (DVS camera chained with a SNN processor). You are supposed to collect the training dataset with DVS camera and make your model as robust as possible in presence of various artificial lights.

1. What would be your strategies at data collection, data engineering and model training level to minimize the effect of flicker noise?

2. Is there any remedy to minimize the flicker noise effect at deployment time?

3. Can you suggest an adaptive algorithm (to be implemented at camera or SNN HW or fully at SW level) to reduce this effect?

Question 2: Training a SNN with temporal data

Sequence and Temporal learning is one of the strengths of Spiking neural networks. SNNs use time dimension of the data and capture order of events. However with insufficient training data or lack of complementary techniques this feature of SNNs can remain underutilized.

In the application described above you want to classify 4 gestures:

- circulating hand clockwise (CW)

- circulating hand counter clockwise (CCW)

- clapping

- playing drum

You train and deploy your model. With your flicker removal strategies it works well under various indoor lightning conditions. However your model seems to perform poorly for 2 first classes and it confuses CW and CCW movements. How do you approach this problem?

Note

For both question above no training, coding or deployments is required. You can share your solutions and discuss it with diagrams and/or at high level algorithmic designs.