Live Demonstration: Real-time Implementation of Proto-Object Based Visual Saliency Model

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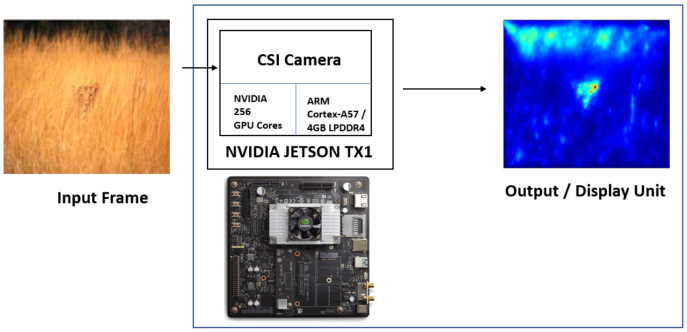

Fig. 1. Visual Saliency map generation in real time using NVIDIA TX1 board.

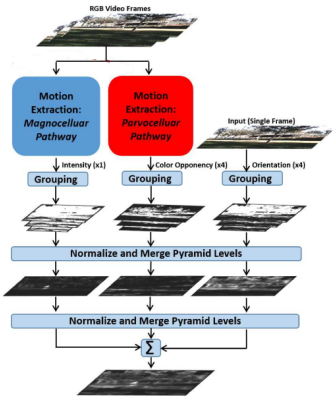

Fig. 2. Architecture of the Dynamic Proto-Object based Visual Saliency - SpatioTemporal filters used to generate the saliency map [1].

I. DEMONSTRATION SETUP

We will demonstrate a real-time implementation of a protoobject based neuromorphic visual saliency model [1] on an embedded processing board . Visual saliency models are difficult to implement in hardware for real-time applications due to their computational complexity. The conventional implementation is not optimal because of the requirement of a large number of convolution operations for filtering on several feature channels across multiple image pyramids. Our current implementation considers the dynamic temporal motion change by convoluting along time efficiently by parallelly processing them. We have implemented the model on an NVIDIA Jetson TX1 board (Fig. 1), which has NVIDIA Maxwell GPU with 256 NVIDIA CUDA Cores, hosted on an Ubuntu environment. The board has a 5 MP fixed focus MIPI CSI camera through which the frames are fetched using a Quad-core ARM Cortex-A57 MPCore Processor with 4 GB LPDDR4 Memory. The camera module fetches the frames to the application for processing, and the result is then displayed through the HDMI port. The application is written in Tensorflow, Cuda, and Python and uses several Python libraries. For further analysis, the user can also save the output onto a file.

II. VISITOR EXPERIENCE

With the setup as described in Fig. 1, for the real time video capture sourced from the CSI camera, visitors will be able to see a real time saliency map(from TX1 board) on the display. Visitors will thus observe the processing of the neuromorphic visual saliency model (Fig. 2) in real-time, which is inspired from the biological dynamic visual attention pathway. They will also gain insights into the processing capability of the implemented model.

III. RESULTS

We will demonstrate the capability of the proto-object based neuromorphic visual saliency model, on video, running in realtime on the TX1 developer kit. This implementation allows us to make the most of the available hardware, by using threads, asynchronous computation, and queues attaining upto 20fps. Future work will explore alternatives to increased model efficiency and speed.

IV. ACKNOWLEDGMENT

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REFERENCES

[1] J. L. Molin, A. F. Russell, S. Mihalas, E. Niebur, and R. Etienne-Cummings, "Proto-object based visual saliency model with a motion-sensitive channel," in *2013 IEEE Biomedical Circuits and Systems Conference (BioCAS)*. IEEE, 2013, pp. 25–28.