

Raw Banks

SuperPixel Logic

Angelo Carbone, Serena Maccolini, Tommaso Fulghesu

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SuperPixel

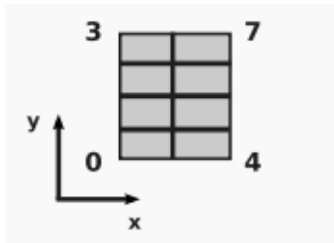


Figure: SuperPixel format

- 8 neighbouring pixels
- Orientation depends on the Sensor to which it belongs to
- First clustering techniques
- FPGA-friendly using Raw Bank

Raw Bank

A raw bank contains information relative to each hit SuperPixel of a Sensor (192×128 SP)

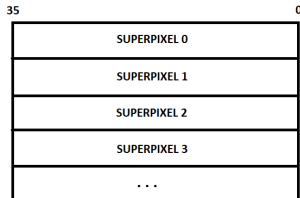
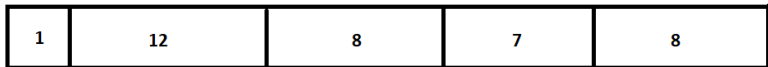


Figure: Raw bank format

SP word

Each raw bank is composed by a 36-bit word



- 1 bits for the "hint"
- 12 bits for the SP time information (25ns sampling, 6ps time resolution)
- 8 and 7 bits for SP spatial position
- 8 bits for px inside SP

SP Time distribution

Time coordinate associated to a superpixel is $O(\text{ns}) \rightarrow 10$ bits

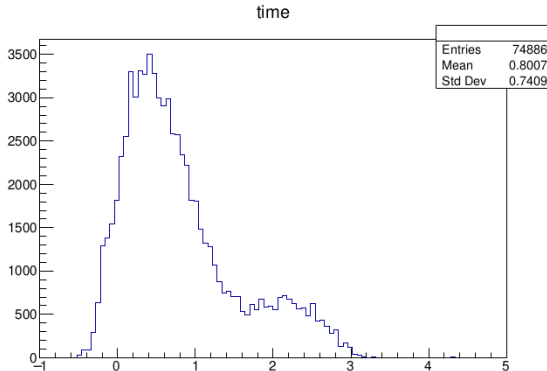


Figure: Time associated to a superpixel wrt event time

SP time assumption

The time associated to each pixel is given by two terms:

$$t_{px} = t_{ov} + v_{part} * |z_{px} - z_{ov}| * \frac{p}{p_z}$$

Assumption: $t_{SP} = t_{px_{first}}$

TEST: RMSE for each SP

RESULT: Few number of SPs with more than 1 hit pixels have $RMSE \neq 0$
(264 entries vs 74886 SP)

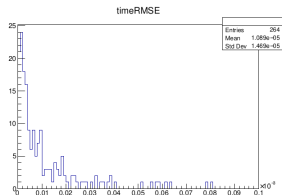


Figure: $RMSE \neq 0$ associated to a superpixel with more than one ON pixel

Next steps

- Test directly with FPGA;
- Build raw bank even using pixel logic;
- Clustering algorithms based on the SP.