



Muon trigger for mobile phones

on behalf of the CRAYFIS collaboration

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Motivation

CRAYFIS experiment

Experiment Cosmic RAYs Found In Smartphones aims to create a world-wide distributed mobile-phone based observatory for Ultra-High Energy Cosmic Rays.

Muon trigger:

- › efficient trigger algorithms plays crucial role in the experiment;
- › minimally ionizing particles (e.g. cosmic-ray muons) are of main interest;
- › **main assumption:** minimally ionizing particles leave low-brightness traces;
- › computationally efficient cosmic muon trigger is a challenging task.

Muon trigger

Cascade Convolutional Neural Networks:

- › conventional Convolutional Neural Networks (CNN) are state-of-the-art visual pattern recognition methods;
- › Cascade Convolutional Neural Networks is a modification of CNN to considerably reduce computational cost.

Experiment:

- › Cascade Convolutional Neural Networks show considerable reduction in computational cost in comparison to conventional CNN;
- › computational cost only slightly exceeds cost of the simplest trigger strategies showing much higher trigger efficiency metrics.