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A machine learning approach in the estimation of a radioactive source position using a coded aperture device

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In this work we compare the traditional correlation process of a Coded Aperture device to estimate the spatial coordinates of γ-emitters with a different approach: We have developed machine learning algorithms based on Gradient Boosted Decision Trees (BDTG) and Deep Neural Networks (DNN). The algorithms have been trained using 18000 shadowgrams created with simulation. A custom fast simulation tool was used to produce shadowgrams due to sources placed randomly at 18000 different positions within the FOV and up to a distance of 4.5m from the detector plane. The performance of the algorithms has been evaluated with the aid of a different independent sample of shadowgrams.

Authors: Dr KARAFASOULIS, Konstantinos (Hellenic Army Academy); Dr KAISSAS, Ioannis (Greek Atomic Energy Commission); Dr PAPADIMITROPOULOS, Christos (Department of Aerospace Science and Technology, National and Kapodistrian University of Athens); Dr POTIRIADIS, Constantinos (Greek Atomic Energy Commission); Prof. LAMBROPOULOS, Charalambos Pan (Department of Aerospace Science and Technology, National and Kapodistrian University of Athens)

Presenter: Dr KAISSAS, Ioannis (Greek Atomic Energy Commission)

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