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Evaluation of a Surveillance Review Software based on Automatic Image Summaries

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Surveillance streams from safeguards instruments contain thousands of images. Inspectors review them in order to find safeguards-relevant events. Statistically a very small fraction of the images is expected to be safeguards-relevant. For this reason inspectors need a tool which helps them to focus their attention directly to the relevant parts of the surveillance stream.

The current approach for surveillance review makes use of scene change detection within areas of interest (AOIs). The data reduction provided can be effective for the review of regular processes, and requires specific knowledge of the process/environment under review for the proper setting of the AOIs.

The VideoZoom approach, developed by the European Commission Joint Research Centre-Institute for Transuranium Elements (JRC-ITU), detects scene changes on the whole image plane. Changes are then summarised and rendered at different levels of abstraction in four layers of summaries, each one revealing more information about the image changes. By means of a zooming interface, the reviewer is able to navigate the summary layers and decide which are to be examined with full photographic detail or skipped because they are clearly not safeguards-relevant. In this way reviewers can make best use of their time by investigating what really requires their attention.

VideoZoom was evaluated by a group of IAEA inspectors on a benchmark of image reviews, with promising results in terms of identification of safeguards-relevant events, efficiency and usability. Following the positive results collected during the preliminary benchmark, the IAEA initiated a task under the European Commission Support Programme (EC SP), aimed at the research, development, and evaluation of surveillance review software based on VideoZoom and compatible with surveillance streams produced by NGSS cameras, the current safeguards surveillance technology deployed by the IAEA.

This paper provides a description of the VideoZoom approach to surveillance reviews, presents results of the evaluation performed by IAEA inspectors, and reports about the current development status.

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