TECHNOAWARE

TECHNOLOGIES FOR AMBIENT INTELLIGENCE

VTrack*SP*-SafetyGuard

Video Analysis for automatic and real time monitoring and notification of people's compliance with the rules and restrictions related to the management of a pandemic situation

- Social distance
- People counting

- Gathering
- Dwell time

Queue management	Public areas	Working sites	Retail

TECHNICAL SPECIFICATIONS

General features

- Modular and hardware-independent software architecture, available for Windows o.s
- Integrating the most advanced self-adaptive algorithms, based on DeepLearning, Self Learning Background Modeling and Multi-Target Tracking, for the most robust and reliable detection and classification performances with any environmental conditions (atmospheric phenomena, vegetation, lights changing, WDR noise, camera noise, …)
- Acquisition from:
  - IP cameras (optical or thermal), through standard protocols RTSP ONVIF with encoding formats Mjpeg, mpeg2, mpeg4, h264, h265
  - analogue cameras (optical or thermal), through video encoders or hybrid NVR/DVR compatible with through standard protocols RTSP ONVIF with encoding formats Mjpeg, mpeg2, mpeg4, h264, h265
  - compatible VMS/DVR/NVR platforms
  - video footages, exported in all standard formats (avi, mkv, asf, mpg, mov, …)
  - single images, in jpeg format
  - USB or integrated web cams
  - Intel depth-cameras
  - thermographic sensors, through Genicam protocol
- Automatic and real time notifications to:
  - TechnoAware-CentralManager client, local or remote
  - compatible VMS/DVR/NVR platforms
  - I/O contacts, through Modbus protocol
  - http or TCP network sender, customizable
  - e-mail, with in attachment the image related to the notified alarm
  - FTP client, saving the video clip related to the notified alarms
- Real time or off-line fruition of the processed data through:
  - TechnoAware-CentralManager client, local or remote
  - VTrack WebInterface
  - cgi call, for receiving automatically an xml file through http with the required data
  - compatible third-party platforms
  - automatic periodical report in pdf format, customizable by project
- Ability to process the acquired video stream at a lower resolution and frame rate
- Ability to crop and process independently unlimited image portions of the acquired video flow
- Ability to configure unlimited independent active rules, by drawing in the image virtual polygonal areas of any shape and size
- Detection, tracking and management of unlimited targets in the scene
- Ability to set up and activate unlimited configurations of cameras, functions, rules and parameters, according to:
  - planned timetable
  - manual trigger
  - time-based trigger
  - time duration trigger
- Ability to import/export configurations previously set up
- Ability to manage different configurations for different configured presets of a PTZ camera
- Enabling/disabling of the modules by:
  - an interrupt from an external input, through cgi call
  - time scheduling, by timetabled configuration
  - manual command, through VTrack-CentralManager client

- polling the status of an external I/O, through http or TCP call
- API for streaming out, by rtsp protocol, the real time processed video flow with the overlays of targets' bounding boxes and trajectories, for being acquired by compatible third-party platforms
- Ability to provide the position of each detected target in georeferenced coordinates (GPS, GIS), by calibrating the processed cameras on georeferenced maps
- VirtualAlertRule function, for configuring a notification by correlating the occurring of multiple alarms configured on the same camera or on other cameras connected locally
- Tampering function, to trigger an alarm on detection of camera obscured, dazzled or moved for longer than a configured time
- QualityCam function, to trigger an alarm on the reduction of visibility of the camera (i.e. because of dirt)
- VideoLoss function, to trigger an alarm notification in case of a loss of communication with a video source
- PrivacyBlur function, for the streaming of the video flow with the detected targets blurred in accordance with the privacy law
- Active diagnostic monitoring of the working status, through:
  - Watchdog function, for the automatic restart of the module in case of critical error or eventual restart of the hardware unit
  - HeartBeat function, for the periodical notification of the correct working of the module to an external device
  - CheckConfig function, for checking by a html/xml request the status of the active configuration
  - writing and storing of log files for each main process of the module
  - VTrack-Monitor Client, for configuring automatic notifications in case of misfunctioning events of the connected VTrack modules
- Built-in database for the storage of processed events and data
- Ability to manage redundant architectures, by active FailOver function (both n:n or n:1 cases available)
- Ability to work in virtualized environments
- TechnoAware-CentralManager Client, for:
  - centralized configuration of unlimited local or remote VTrack modules
  - centralized live view of the connected local and/or remote VTrack modules
  - centralized real time visualization and management of the alarms and data, notified by unlimited connected local and/or remote VTrack modules
  - real time or off-line simulation of the processing results, to verify the behavior of the configured video processing parameters
  - visualization of the bounding box and trajectory of the detected targets, either in the live view and in the alarms panel
  - ability to record and store video clips from the acquired video sources, in continuous or based on specific events
  - Forensic tool for retrospectively applying rules to a processed scene, filtering the targets by time, class, color, location and direction of movement (target's classification available by integrating the function VTrack-DeepLocator)
  - automatic multi-camera tracking of single or multiple targets triggered manually or by the occurring of specific alarm events (tag and track), in live mode or in recorded mode for forensic analysis
  - ability to configure different user profiles, allowing to enable or to inhibit for each one the access to specific views or functionalities

Functional features

- Ability to configure unlimited virtual areas, of any polygonal shape and size
- For each configured virtual area, counting and collection of the number and the dwell time of persons inside
- For each configured virtual area, detection and notification of the number of persons inside being equal to or higher/lower than a defined threshold
- For each configured virtual area, detection and notification of a space between targets lower than a defined threshold and for longer than a continuous certain time
- Camera calibration in real space, through homography via GPS coordinates or plan maps
- For each configured active zone, ability to configure independent alarm notifications for:
  o start of alarm condition
  o end of alarm condition
- Filtering of targets by class, linear size or area
- 3D perspective management, by linear interpolation on image, or by image calibration
- Morphological Filter, for improving the efficiency of targets' detection and segmentation by shape enhancement
- Foreground Filter, for the image stabilization and for the limitation of heavy dynamic background noise (e.g. dense vegetation, heavy rain, clouds, …), selective on specific configurable areas

- Ability to configure a parameter of confidence time for the target detection
- For each configured active zone, ability to select specific active points of the detected target
- For each configured active zone, filtering of targets with specific size and/or color
- Unlimited configurable no-processing areas, to inhibit not-of-interest areas in the image
- Unlimited configurable no-initialization areas, to filter the targets initialized where no targets of interest are expected to appear
- Alarm recurrence filter, for disabling the alarm notifications for a configured time after an already notified previous one
- Ability to enable and configure advanced parameters, such as:
  o Adaptive pre-filtering for the limitation of heavy noise
  o Specific algorithms for filtering shadows or heavy light changes
  o Gradient-based low-level algorithm, for the extraction of the contours of the scene
  o Automatic background reset for sudden anomalous change of the image larger than a certain percentage
  o Automatic dynamic adjustment of the contrast sensitiveness, according to the changing of the image contrast (e.g. because of night-time, fog, rain, …)
  o GammaCorrection Filter for enhancing the image contrast
  o Target's inhibition control by permanence time and percentage of movement
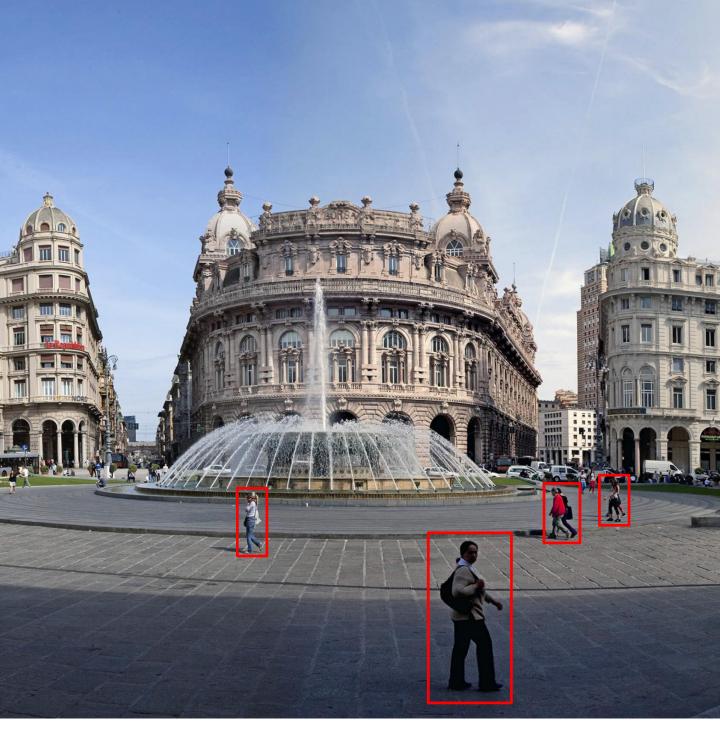

TECHNICAL REQUIREMENTS

Image and video streaming requirements

- Conditions of the target in the image for maximizing the detection performances:
  o clearly visible to the naked eye in the image, even in difficult environmental conditions (night, heavy rain, snow, fog, sun glare, reflections, artificial lights, underexposed/overexposed camera, obstacles, …)
  o entirely visible in the image for at least 10-15 continuous frames

  o minimum size: area of 400 pixels, at the farthest point where the detection is required (for example a bounding box of 10x40 pixel for a person)
  o minimum contrast between target's contours and its surrounding area 15 levels of color difference
- Minimum frame rate: 10 frames per second for complex outdoor scenarios; 5 frames per second for simple indoor scenarios

Processing requirements

- Computational need:
  o CPU: considering, as reference, a single core 2,8GHz base speed
    - up to 3 functions in parallel processing video flows in VGA resolution (640x480) at 10 frames per second
    - up to 2 functions in parallel processing video flows in 4CIF resolution (704x576) at 10 frames per second
    - up to 2 functions in parallel processing video flows in 800x600 resolution at 8 frames per second
    - up to 1 function processing video flows in FullHD (1080p) resolution (1920x1080) at 5 frames per second

  o RAM: about 80MB for each function processed in parallel
  o GPU: NVIDIA CUDA with at least:
    - 4GB RAM DDR5,
    - 768 CUDA cores
- Supported OS: Windows 10 or later
- Web interface:
  o optimized for Chrome browser
  o other tested browsers: IE9, IE11, Firefox, Safari
  o plug-in Adobe Flash Player installation required

TECHNOAWARE
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TechnoAware researches and develops technologies, products and solutions for video analysis and Artificial Intelligence.

Founded in 2003 from the
University of Genoa's ISIP40 Research Group,
with more than 35 years of
experience, competence and know how
TechnoAware's Team is one of the
foremost experts worldwide
in video analysis and Artificial Intelligence.