TechnoAware

Company Profile

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.

VTrack

Video Analysis for intelligent video surveillance

Born from the results of more than 35 years of research activities, VTrack is the most complete suite of Video Analysis functions.

Constantly up to date with the scientific state of the art, VTrack always integrates all the latest video analysis algorithms and methods for the most performing and reliable intelligent video surveillance solutions.

VTrack - Available server-based functions

Intrusion

Detection and notification of the intrusion within virtual areas or the crossing of virtual lines (TripWire) by targets of interest

GateFlow

Counting and collection of the number of persons crossing virtual gates in a certain direction

AreaCounting

Counting and collection of the number and the dwell time of targets of interest inside virtual areas, and for each area notification of the presence of a number of targets of interest equal to or higher/lower than a defined threshold

OccupancyRate

Estimation and collection of the percentage of occupancy within virtual areas by targets of interest, and for each area notification of an occupancy percentage higher than a defined threshold

HotZones

Estimation and visualization in false colors on the image and on a map of the zones with higher or lower presence of persons within a defined timeframe inside virtual areas

ATM

Detection and notification of one or more than one person remaining within a virtual area for longer than a defined time

LeftObject

Detection and notification of objects left unattended within virtual areas for longer than a defined time

StolenObject

Detection and notification of objects removed from virtual areas

Loitering

Detection and notification of targets of interest remaining within virtual areas for longer than a defined time

PanicDisorder

Detection of sudden or anomalous variation of speed and/or acceleration of targets of interest within virtual areas

SlipFall

Detection and notification of a person falling and remaining on the ground for longer than a defined time

Counting

Counting and collection of the number of targets of interest crossing virtual gates in a certain direction

AvSpeed

Estimation and collection of the average speed of targets of interest, and notification of average speed exceeding or below a defined threshold

StationaryVehicle

Detection and notification of vehicles, stationary within virtual areas for longer than a defined time

WrongWay

Detection and notification of targets of interest moving toward a not allowed direction within virtual areas

SmokeFire

Detection and notification of smoke and/or fire within virtual areas

FaceDetection

Detection and notification of the presence of human faces within virtual areas and, for each detected face, collection of its permanence time

LPR

Detection and reading of vehicles license plates for access control management

SkimmerDetection

Detection and notification of the presence of minimal variations of the position of contours within a virtual area (ATM)

ParkingLot

Detection and notification of the status (free/occupied) of configured parking areas

LackRefill

Detection and notification of the lack of objects inside a configured area (i.e. basket, shelf, trolley area, …), below a defined occupancy threshold

Thermal

Detection and notification of targets of interest within a defined temperature range inside a configured virtual area, by processing thermometric cameras

PTZStandAlone

Detection, notification and tracking of targets of interest by processing a Pan/Tilt/Zoom camera

PTZPlugIn

Automatic piloting of a Pan/Tilt/Zoom camera for tracking a target of interest alarmed by a VTrack function processing one or more connected fixed cameras

Custom

Development of a custom function based on specific requirements

VTrack - Functional Specifications

General architecture

- ✓ Modular and hardware-independent software architecture, available for Windows o.s.
- ✓ Video flow acquisition from:
  - IP cameras (optical or thermal) or video encoders, compatible or acquirable through standard protocols rtp/rtsp, mjpeg or ONVIF
  - compatible VMS/DVR/NVR platforms
  - off-line videos in all standard formats (avi, asf, mpg, mov, …)
- ✓ Automatic and real time alarm notifications to:
  - TechnoAware-CentralManager client, local or remote
  - compatible VMS/DVR/NVR platforms
  - I/O contacts through Modbus protocol
  - network http or TCP notification, customizable
  - e-mail, with in attachment the image related to the generated alarm
  - FTP client, saving the video clip related to the generated alarm
- ✓ Real time or off-line data fruition (events, counting, plates, other data) by:
  - VTrack WebInterface
  - external cgi call, for receiving back automatically an xml file through http with the required data
  - automatic periodical report in pdf format, customizable by project
- ✓ For each configured active zone, ability to configure independent alarm notifications for:
  - start of alarm condition
  - end of alarm condition
- ✓ For each configured active zone, ability to configure an absence alarm notification in case of no alarm event occurred within a defined timeframe
- ✓ VirtualAlertRule function, for the generation of alarms by correlating in AND within a certain time the occurring of multiple alarms configured on the same camera or on other cameras connected locally
- ✓ Enabling/disabling of the modules by:

- an interrupt from an external input, through cgi call
- the polling of the status of an external I/O contact, through http or TCP call
- time scheduling, by timetabled configuration
- manually, by VTrack-CentralManager client

✓ Ability to stream out, by rtsp protocol, the real time processed video flow with the overlays of target's bounding boxes and trajectories for being acquired by compatible third parties platforms

✓ PrivacyBlur function, for the streaming of the video flow with the detected targets blurred in accordance with the privacy law

TechnoAware-CentralManager client

✓ Centralized configuration of unlimited local and/or remote VTrack modules

✓ Automatic detection of all VTrack servers connected in the same sub-network

✓ 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 correctness of the configuration

✓ Visualization of the bounding box and trajectories of the detected targets, either in the live view and in the alarms panel

✓ Real time visualization of the detected targets trajectories on a calibrated map

✓ Recording and storing in local directories of continuous or event-based video clips

✓ Centralized configuration of different user levels, allowing or inhibiting for each one of them the access to specific areas of the module

✓ Ability to generate reports of the alarm events occurred or the data collected (counting, speed, occupancy, license plates, …) in a defined timeframe by a specific configured function, in PDF format

VTrack-WebInterface

✓ Real time visualization of the current data (counting, speed, occupancy, license plates, …) related to the specific configured function, numerical and graphical

✓ Interrogation and visualization of the stored data related to the specific configured function in a certain timeframe, numerical and graphical

✓ Ability to export of the stored data in csv format

✓ Ability to make a manual reset of the visualized counting data

Video Analysis' engine features

✓ Robust and reliable in filtering false alarms due to atmospheric phenomena, vegetation, changing of environmental conditions, thanks to the most advanced self-adaptive algorithms based on Self Learning Background Modeling and Multi-target Tracking

- ✓ Detection and tracking of unlimited targets in the scene
- ✓ Specific algorithms for filtering shadows and light changes
- ✓ Gradient-based low level algorithm, for the extraction of the contours of the scene
- ✓ Adaptive pre-filtering for the limitation of heavy noise
- ✓ Automatic dynamic adjustment of the algorithms sensitiveness, according to the changing of the image contrast (e.g. because of night time, fog, rain, …)
- ✓ Automatic dynamic filtering of heavy spotted noises (e.g. big rain drops, insects, …)
- ✓ Morphological Filter, for improving the efficiency of targets detection and/or separation 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
- ✓ 3D perspective management, by linear interpolation on image, or by image calibration

Module configuration features

- ✓ Ability to set up unlimited cameras and parameters configurations, according to timetabled or manual scheduling
- ✓ Ability to import/export a configuration database previously set up
- ✓ Unlimited configurable independent active zones, of any shape and size
- ✓ Ability to crop and process independently unlimited image portions of the acquired video flow
- ✓ 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
- ✓ Filtering of targets by size, area and dynamics
- ✓ 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
- ✓ Ability to manage different configurations for different configured presets of a PTZ camera
- ✓ Ability to process the acquired video flow at a lower resolution and frame rate

Diagnostic

- ✓ 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
- ✓ Ability to check the status of the active configuration by html/xml request, or by using the relative view in the TechnoAware-CentralManager
- ✓ 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 on the loss of the video flow communication to the module
- ✓ VTrack-Monitor Client, for the configuration of automatic notifications for misfunctioning events of the connected VTrack modules

Licensing

- ✓ Licensing per each video flow current configuration, according to the number of functions working in parallel, regardless of the specific function (unless for Special Packages)
- ✓ License bound to the processing server unit, not bound to the video stream device (camera, encoder, ..)
- ✓ No server licenses needed, no added plug-in licenses needed
- ✓ Local or remote VTrack license management through TechnoAware-CentralManager client
- ✓ Full availability of failover license management

VTrack - Technical requirements

- ✓ Conditions of the target in the image for maximizing the detection performances:
  - clearly visible to the naked eye in the image, even in difficult environmental conditions (night, heavy rain, snow, fog, sun glare, reflections, artificial lights, under/overexposed camera, obstacles, …)
  - entirely visible in the image for at least 10-15 continuous frames
  - the most possible separated from the other targets in respect with the camera view's perspective
  - minimum size: area of 100 pixels, at the farthest point where the detection is required (i.e. 5x20 pixel, thus 10pixels/meter, for a person)
  - maximum size: about 1/4 of the image
- ✓ Minimum frame rate: 8fps
- ✓ Suggested image resolution: according with the object minimum size requirement (in general, CIF/QVGA for detecting persons along a perimeter; 4CIF/VGA/SVGA may be needed for detecting little targets)
- ✓ Supported OS: Windows 7 or later
- ✓ Web interface:
  - optimized for Chrome browser
  - other tested browsers: IE9, IE11, Firefox, Safari
  - plug-in Adobe Flash Player installation required
- ✓ Computational need:

- CPU: up to 6 functions in parallel processing video flows in CIF/QVGA resolution at 10fps, or up to 2 functions in parallel processing video flows in 4CIF/VGA/SVGA at 8fps, per single core 2.8GHz
- RAM: about 80MB for each processed function in parallel

TFace-Recognition

Video Analysis for biometric face recognition

TFace-Recognition is a Biometric Artificial Intelligence based video analysis application for identifying or verifying uniquely a person, by comparing its facial features detected from digital images or video frames with faces within a database.

TFace - Functional Specifications

General architecture

- ✓ Modular and hardware-independent software architecture, available for Windows o.s.
- ✓ Video flow acquisition from:
  - IP cameras (optical or thermal) or video encoders, compatible or acquirable through standard protocols rtp/rtsp, mjpeg or ONVIF
  - compatible VMS/DVR/NVR platforms
  - off-line videos in all standard formats (avi, asf, mpg, mov, …)
- ✓ Automatic and real time alarm notifications to:
  - TechnoAware-CentralManager client, local or remote
  - compatible VMS/DVR/NVR platforms
  - I/O contacts through Modbus protocol
  - network http or TCP notification, customizable
  - e-mail, with in attachment the image related to the generated alarm
  - FTP client, saving the video clip related to the generated alarm
- ✓ Enrolment of the face templates and images through:
  - Real time acquisition from camera device
  - Import of faces images and data coming from external databases (i.e. police mugshots, personnel archives - by project)
  - Manual entry of images or off-line videos
- ✓ Identity data editing by:
  - Manual entry
  - Data import from external databases (by project)
- ✓ Ability to configure real time alarm notifications in case of:
  - Person recognized among a configured group of persons stored in the database
  - Person recognized, but not present in any of the configured groups of persons in the database
  - Person unknown

- Identity data editing by:
- Manual entry
- Data import from external databases (by project)

✓ Ability to detect and identify several faces present in the image at the same time

TFace - Technical requirements

✓ Conditions of the face in the image for maximizing the identification performances:
- clearly visible to the naked eye in the image, even in difficult environmental conditions (night, heavy rain, snow, fog, sun glare, reflections, artificial lights, under/overexposed camera, obstacles, …)
- with a resolution that guarantees at least 80 pixels eye-to-eye at the point where the face is meant to be identified
- with an angle of radial inclination in respect with the camera not larger than 20°-25°
- entirely visible in the image in the above indicated conditions for at least 10-15 continuous frames

✓ Supported OS: Windows 7 or later

✓ Computational need:
- CPU: about 125k comparisons/second, with a single core 3,2GHz
- RAM: about 9kB per enrolled template