AMPED SOFTWARE

AMPED FIVE

FORENSIC IMAGE AND VIDEO ENHANCEMENT

- Load images, videos, and hundreds of proprietary CCTV/DVR formats
- Analyze and interpret file data and structure
- Restore and enhance to clarify license plates, objects, and faces
- Measure the size and speed of objects
- Output video presentations with redacted frames and audio
- Generate automatically a detailed scientific report

WHAT IS AMPED FIVE?

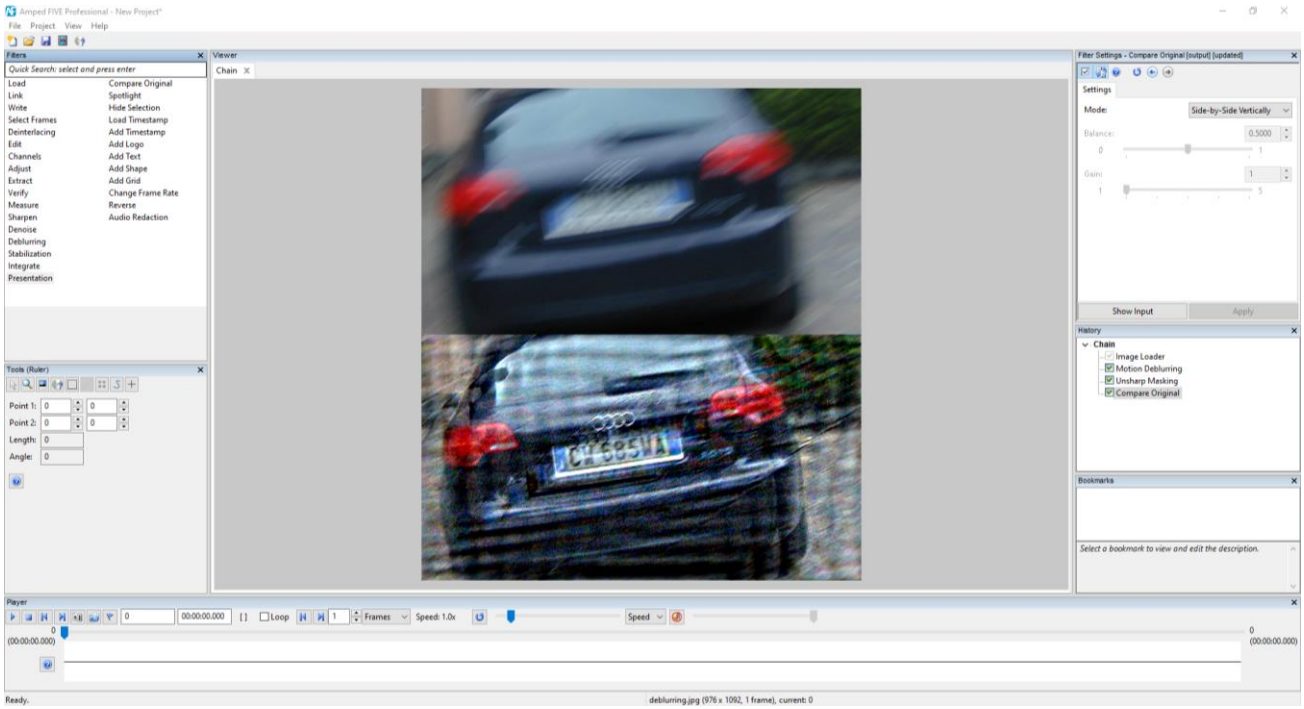
Amped FIVE is the most complete image and video forensics software, acclaimed for its reliability and workflow efficiency. Amped FIVE was designed to answer the need in providing solid, scientific-based forensic image and video enhancement for worldwide legal systems. Image and video analysts worldwide have contributed to the development of the software used today, ensuring all aspects of the investigation process can be completed within a single application. Developed specifically for forensics, public safety and national security, this all-in-one solution has more than 140 filters and tools, to convert, process, enhance, analyze, present and document images and videos.

It supports any type of image and video data retrieved from various multimedia sources (including audio streams) from CCTV and DVR systems, body worn cameras, dash cameras, drones, mobile phones, fingerprints, documents, and much more. Support for hundreds of proprietary video file formats is continuously updated according to end user requests.

With a logical and nondestructive workflow, Amped FIVE can stabilize shaky videos, correct blurred details, or adjust noise and lighting issues. It also offers specialized features such as super resolution, redaction, photogrammetry, optical distortion and aspect ratio correction, perspective correction and alignment in multiple frames.

Amped FIVE meets the needs of judicial systems worldwide, by using scientifically validated algorithms, and producing a report with all the processing steps, settings, and algorithms used in the analysis. It validates the reliability of the digital evidence to be admissible in court.

Amped FIVE is used by forensic labs, law enforcement, government, military, and security organizations worldwide. Municipalities, court experts and private companies working in the forensic and investigative fields also benefit from this solution.



WHY AMPED FIVE?

Digital videos and images have become a crucial source of evidence in criminal cases. However, many times they are not used to their full potential due to format issues, quality, resolution, or other problems. Amped FIVE gives users the ability to enhance and reveal hidden information within video and image evidence, such as correcting the motion blur effect on an individual's face or enhancing a license plate to reveal previously unidentifiable characters.

Amped FIVE is the most complete image and video analysis software for managing the entire workflow, from conversion, to analysis, enhancement, redaction or spotlight, and report generation. With its workflow and documentation, it guarantees a scientific process that is accurate, repeatable, and reproducible.

Customer technical support is a priority for Amped Software. We are in continuous contact with our users to provide them with improvements, new features, and support for additional video formats to ensure Amped FIVE always meets their ever-changing needs.

It is the only software of its kind that automatically generates a report containing every filter used, the detailed explanation, the settings, and (when applicable) the peer-reviewed scientific source for the filter. This reporting feature is extremely valuable to validate the integrity of the digital evidence to be admissible in court.

Optical Deblurring

Corrects the blur of objects that are out of focus (big blur).

Details:

Optical Deblurring reduces the blurring effect due to incorrect focus settings during the image acquisition process. The algorithm is based on a Wiener filtering, having a circle of diameter *Size* as point spread function (PSF).
In order to filter out the noise it is possible to set the *Noise* parameter, which represents the estimated noise-to-signal power ratio of the image.

Parameters:

- **Size**: 23
  The radius of the point spread function in pixels.
- **Noise**: 0.3981
  Estimate of the noise-to-signal power ratio.
- **Boundary Conditions**: Edge Tapering
  Reduce ringing artifacts near the boundaries of the image.

References:

- Jae S. Lim, "Two-Dimensional Signal and Image Processing", Prentice Hall, Englewood Cliffs, NJ, 1990. ISBN: 0-13-935322-4.
- Anil. K. Jain, "Fundamentals of Digital Image Processing", Prentice Hall, pp. 276–284, 1989. ISBN: 0-13-336165-9.

THE COMPLETE WORKFLOW

MORE THAN 140 FILTERS AND TOOLS FOR ANALYZING DIGITAL MULTIMEDIA EVIDENCE

Evidence integrity is a key element of Amped FIVE. We have developed a nondestructive workflow to ensure the original integrity is always preserved.

Our core philosophy in designing the product is that everything is done by simply applying a filter. This means that there is no re-rendering, no modifying, no altering of the original evidence. The process works the same, whether you are loading a video, exporting a sequence, applying some denoising, selecting frames, taking measurements and so on; this concept of filtering allows for a very fast and predictable workflow.

For each step in the process, every filter takes as input the image or video generated by the previous filter and, after the processing, passes the result to the output filter. You can even modify a filter's settings and see the real time output on another one down the chain. In this way you can see how modifying some values on a previous filter will modify the result. This is very effective especially for complex problems and long chains of filters.

Reviewing and modifying any step of the processing is quick, easy, and as simple as replacing, deleting, deactivating, or moving filters anywhere in the chain. In this way Amped FIVE guarantees speed, effectiveness, and scientific methodology.

Amped FIVE covers the entire video forensics workflow:

1. Import any type of image, video, or sequence of images into Amped FIVE, which supports hundreds of proprietary CCTV video formats with the *Convert DVR* tool. For the video files that cannot yet be played in Amped FIVE, Fallback Procedures are available to automatically look for a 'conversion procedure' that will result in visual information. When that also fails, users can contact our team to analyze the proprietary format and possibly add support for it in the software. As a last resort, there is an integrated screen capture tool for capturing the video during playback with the proprietary player and easily importing it in FIVE.

2. Analyze specific details of images and videos such as EXIF metadata, video format and codec features, frame by frame encoding type and macroblock analysis.

3. Speed-up workflow on long videos by locating the frames of interest with the motion detection feature and choose only the useful frames, by selecting a range, a specific view, or specific frames defined by the user.

4. Process the frames combining more than 140 available filters and tools in unlimited ways, in order to restore specific defects and enhance the final result.

5. Take linear and 3-dimensional measurements on images and video frames. Estimate the speed of vehicles from videos, showing values and their uncertainty range.

6. Save the result of the processing as an image, video, or sequence. It is also possible to show all original frames side by side with the processed version, to demonstrate the work done.

7. Present the available evidence, with tools for combining multiple images and videos together in a timeline or in a grid or picture-in-picture display mode. Frames can be annotated with text, shapes, timestamps. Tools for magnification or redaction are also available. All the mentioned annotations can be set to track objects or key framed. Like any other part of the workflow, also annotations are completely documented in the report.
8. Automatically generate a report containing the scientific methodology of all processing steps. The report provides the scientific references for each filter used and the parameter settings. This aids in the repeatability and reproducibility, important for admission in court.

MAIN FEATURES

Complete

Amped FIVE is a single solution and does not require additional plug-ins, third-party software, or special hardware. This means there is just one platform to learn, maintain and deploy on hardware you already own.

Powerful

Amped FIVE provides more than 140 filters and tools, to analyze, restore, and enhance digital images and videos. Specialized features include redaction, photogrammetry, stabilization, perspective correction, object tracking, deblurring, motion detection etc.

Compatible

Amped FIVE works with any type of image and video data, from CCTV recordings to latent fingerprints, and supports nearly any image and video format, including automatic conversion of most proprietary formats typically used in video surveillance. The software has a built-in tool to convert or capture video from proprietary DVR formats quickly and easily.

Validated

Amped FIVE has been internally validated by many government agencies worldwide, and it has been used and accepted in courts at every level. We actively monitor customer feedback received as part of the accreditation process with the aim of improving the usability of Amped FIVE in ISO accredited labs. All the processes implemented in Amped FIVE follow the principles of the scientific methodology and we apply strict due diligence on the applicability of the algorithms for the forensic environment.

Scientific

Amped FIVE guarantees accuracy, repeatability, and reproducibility. It automatically generates a report, customizable by the user, detailing all the processing steps, settings, and algorithms, with their scientific reference, which is essential to present in court.

Universal

Works on a laptop in the field as easily as on a desktop in the lab. FIVE is compatible with standard PCs (Windows 7/8/10/11, 32 bit and 64-bit versions), and the installation and activation processes are quick and easy.

SAMPLES

The below examples demonstrate just some of the many capabilities of Amped FIVE.

Deblur moving objects

Correct the perspective of objects

Brighten dark images and videos

Measure the height of a subject or something particular in the environment

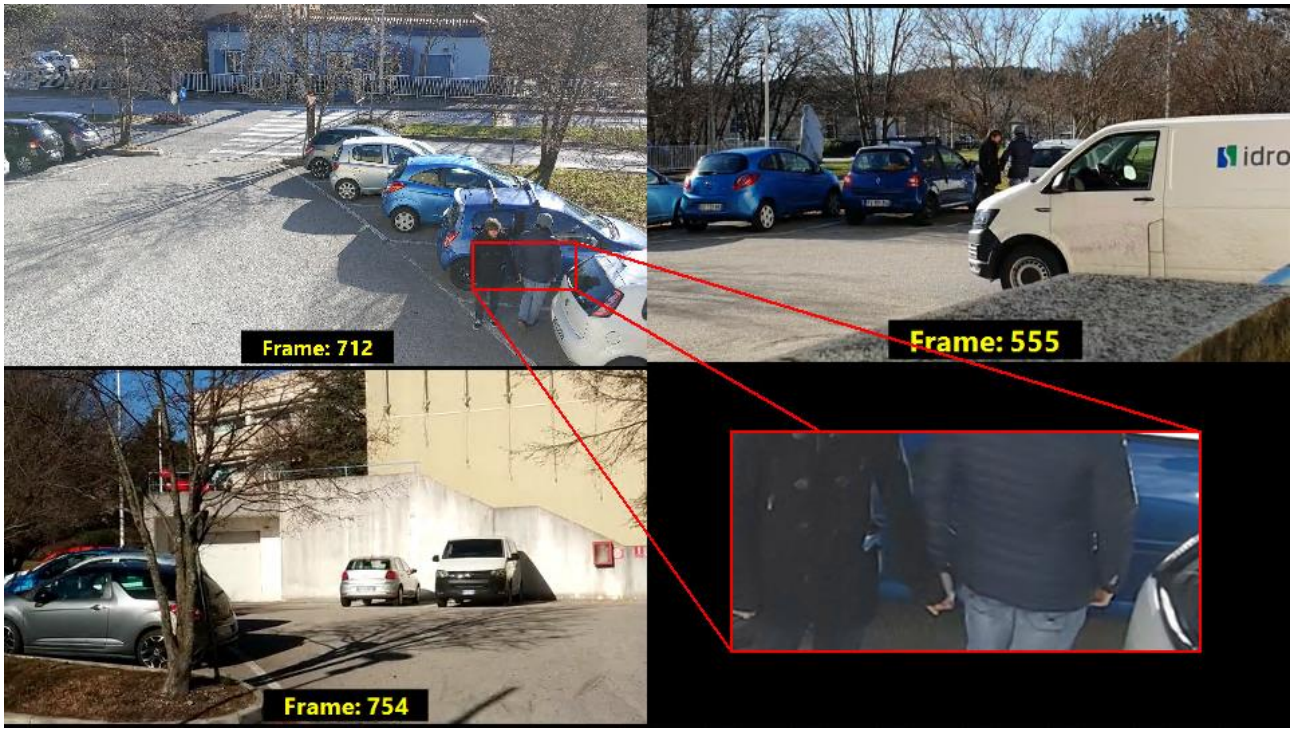
Measure the speed of a vehicle

Enhance images with fog and other environmental conditions

Redact sensitive information in an image or video

Apply our Perspective Super Resolution algorithm

Combine and annotate multiple videos



CASE EXAMPLES

CONVERTING A CCTV VIDEO AND DEBLURRING A LICENSE PLATE

Situation

A hit and run is caught on CCTV footage outside a local supermarket, the vehicle is seen leaving the scene. The video evidence team has been tasked with identifying the license plate of the vehicle.

Workflow

The CCTV footage is in a proprietary format and is unable to play on standard media players, so the video evidence team use Amped FIVE's powerful conversion engine to view the video.

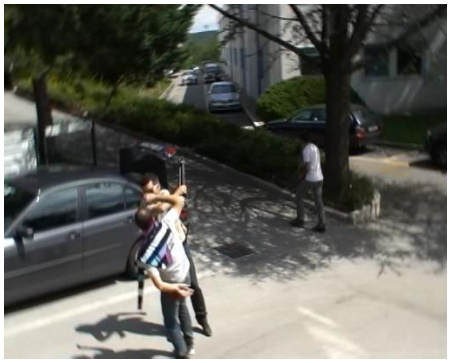
After converting and viewing the footage they can see that the license plate has a blur effect obscuring the details of the license plate. After successfully applying the motion deblur filter they realize that the license plate's resolution and pixel quality in a single frame is not enough. They decide the best course of action would be to stabilize the video and carry out a frame average. The frame average will remove any noise and enhance the details of the license plate further. This proves successful and after cropping and resizing the license plate they can successfully trace the vehicle back to the owner.

Conclusion

The police are now able to bring the suspect in for an interview.

ANALYZING A MOBILE PHONE VIDEO TO IDENTIFY AN OBJECT

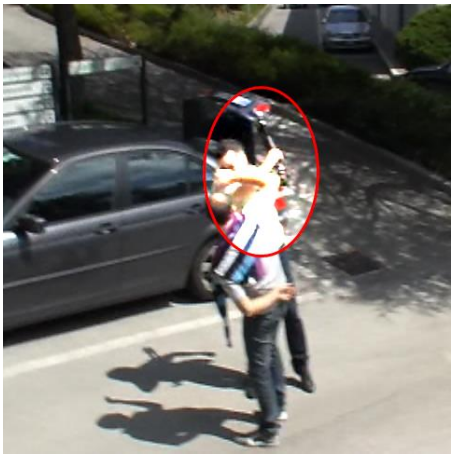
Situation



The police are handed a video recording taken on a mobile phone of an assault occasioning grievous bodily harm.

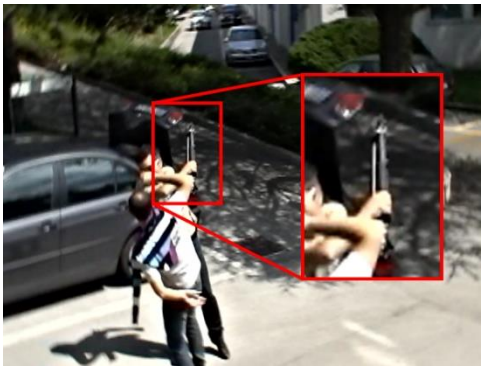
Workflow

The footage taken on the mobile phone suffers from severe camera shake. The video evidence team use Amped FIVE to apply local stabilization on the area of the fight making the video and the actions of everyone much easier to follow. After reviewing the footage, it appears that one of the suspects has an object in one of his hands. Using the filter *Spotlight,* they highlight this area and track it throughout the fight to facilitate the view of the object. It appears the suspect uses it within the fight and could be what caused the serious injuries in the assault. The new video is exported as evidence to be forwarded to the prosecutor to seek a guilty plea or to be shown in court if necessary.



The team is now tasked to try to identify the object. They apply a range selector to the video to select only the relevant frames and begin to analyze them further. By adjusting the contrast in the video, cropping the object, and resizing using the smart resize filter they can clearly make out what appears to be a tripod.

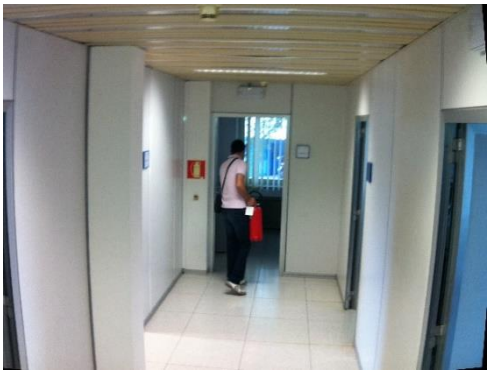
Conclusion



The police are now confident that the suspect in question used a tripod as a weapon during the assault which caused the injuries to the victim.

UNDISTORTING CCTV VIDEO AND MEASURING THE HEIGHT OF A SUSPECT

Situation



The police are handed CCTV footage of an unknown suspect involved in a high value theft.

Workflow

The police requested the Video Analysts to determine the height of the suspect from the CCTV footage. On review of the footage the experts were able to determine that it suffered from distortion created by the camera lens. Using Amped FIVE they can apply the undistort filter to correct this before attempting to analyze the suspects height.

The footage is of high enough resolution and there are enough references on the scene to apply the Measure 3D tool. After the investigators supplied a known measurement from the crime scene the analyst applied the Measure 3D filter to determine the suspect's height with a given error.

Conclusion

The police are now confident that the suspect falls within a certain height range and can narrow their search for the suspect.

MEASURING THE SPEED OF A CAR

Situation

As part of a collision investigation, the speed of a car has to be estimated from an available surveillance video.

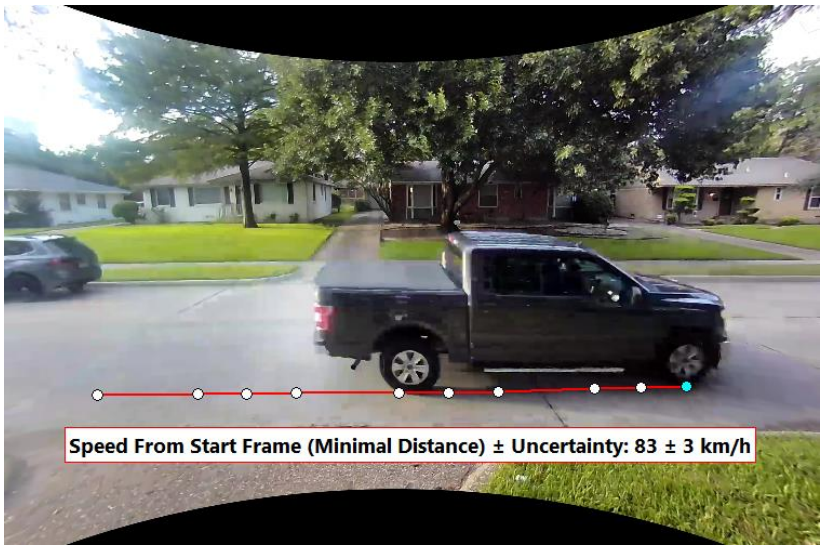
Workflow

The Video Analyst is requested to measure the speed of a car from the available CCTV footage. The expert analyzes the video with Advanced File Info and determines it is the original recording, and it is recorded with variable frame rate. They also detect presence of optical distortion due to the camera's fisheye lens. Using Amped FIVE's Correct Fisheye filter they compensate for such distortion.

The expert uses the Speed Estimation 2d filter to calibrate the scene thanks to a reference object available on the ground. They click on the contact point between the road and the wheel of the car of interest. Since the video has limited resolution, they set a sufficiently large uncertainty box for each contact point. Timing data embedded by the digital video recorder is used as the timing source, so as to automatically account for variable frame rate. The expert measures the speed of the car and the traveled distance. Speed Estimation 2d automatically computes the combined uncertainty and provides it on screen and in the report. The expert exports all data in tabular form, prepare a report and an annotated video where the vehicle's estimated speed is presented at every frame.

Conclusion

Experts are eventually able to lend strong support to the hypothesis that the car was traveling above the speed limit by at least 30 km/h.



REDACTING SENSITIVE DATA AND AUDIO IN A VIDEO

Situation

The Military Police are investigating an individual for an alleged drugs job when they come across body worn camera footage from Afghanistan. Reviewing the footage, they witness a murder of a wounded and unarmed terrorist.

Workflow

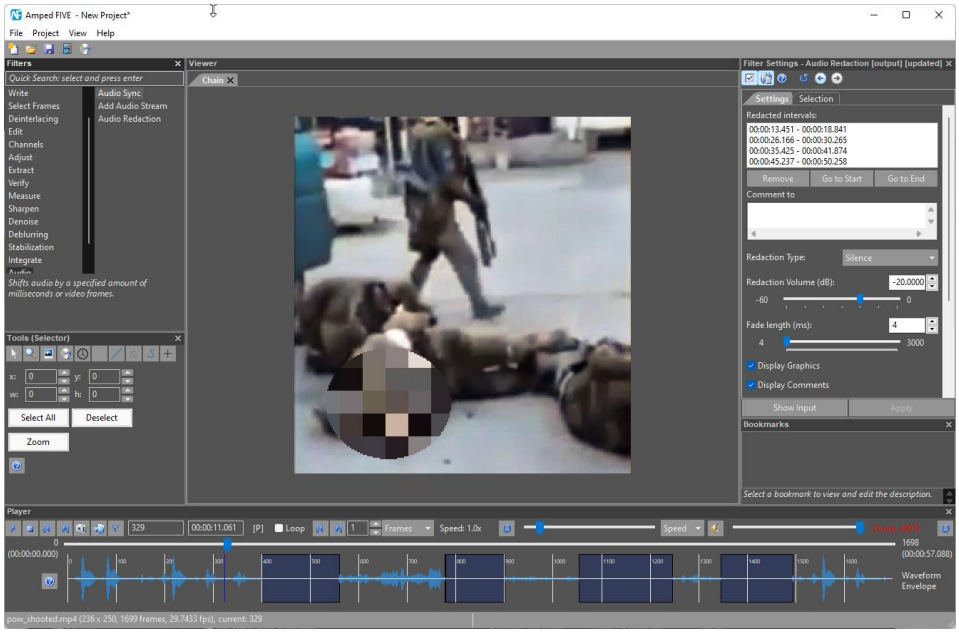
The Multimedia Evidence team has been tasked with producing two pieces of evidence from the footage. They need to help identify the suspect and produce a redacted version of the footage to be released to the media.

In order to identify the suspect, they select the relevant frames in which the suspect is stationary, adjust the levels, crop the head of the suspect, and then apply a frame average to enhance the detail and remove noise. Finally, by resizing the image they have managed to get a clear visual of the suspect.

To create a redacted version of the video they select the relevant frames. Due to strong language and sensitive data, they also apply the *Redact Audio* filter. This enables them to remove any audio required before releasing the video to the media. Finally, they sanitize the video by applying *Hide Selection* to the faces of other people present in the video.

Conclusion

Using Amped FIVE they have successfully managed to release the required footage to the media and create sufficient evidence to identify the suspect.



ENHANCE VIDEO AND AUDIO FROM A PARKING LOT CCTV RECORDING

Situation

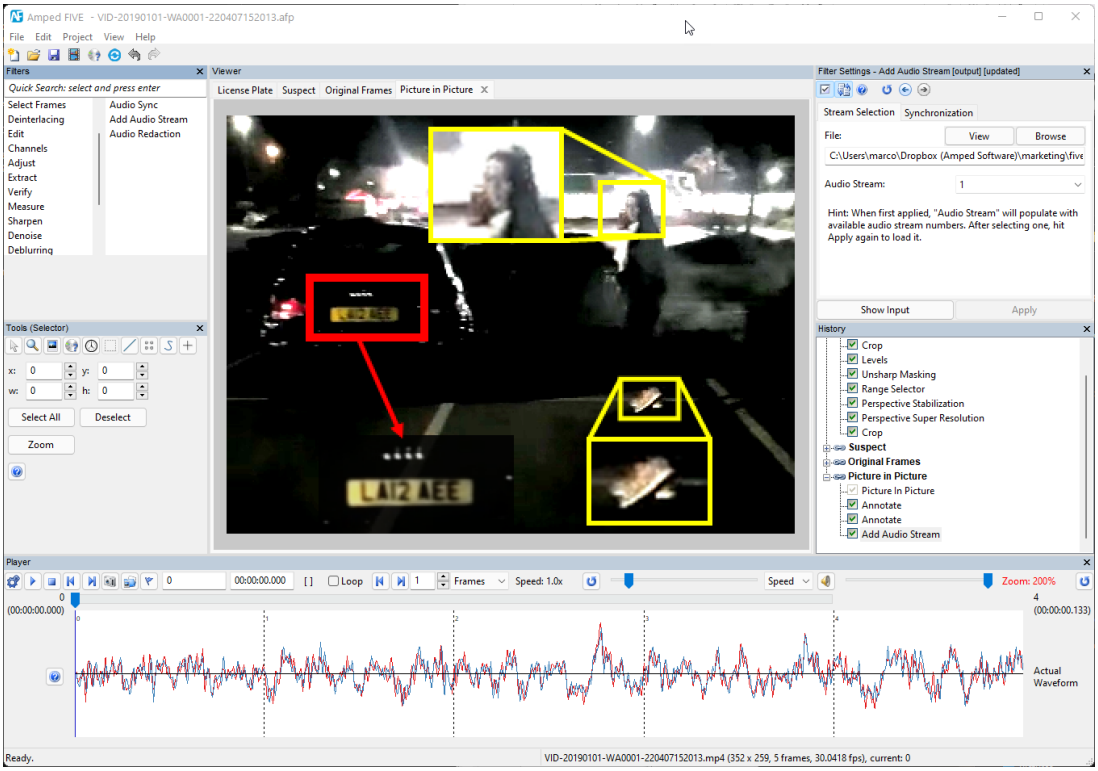
During a robbery investigation, a night-time recording is extracted from a surveillance system in a parking lot. The original file features video and audio, but the video is dark and noisy, and the audio hardly understandable. Little can be seen in the proprietary player, which does not allow exporting.

Workflow

The file is converted, and both the video and audio streams are imported in Amped FIVE. The video is brightened and denoised with Amped FIVE's Exposure and Temporal Smoothing filters. The audio is exported with Audio Writer, enhanced in a dedicated software, and imported back with Add Audio Stream. There's a slight desynchronization caused by the export/import process, but Amped FIVE's audio filters allow compensating for it.

Conclusion

A suspect is now visible while running away on a car, whose license plate has now become visible. Besides that, in the enhanced audio, it is possible to hear them congratulate each other for the venture.



COMPARING IMAGES TAKEN AT DIFFERENT TIMES

Situation

Following a deadly collapse of a building, investigators need to assess the cause of the incident. Two aerial pictures acquired years apart must be compared to assess whether the building had been illegally reshaped in time. The older picture has no colors and suffers from a noise pattern that complicates comparison. Moreover, pictures were taken with different equipment, and the perspective is not consistent between the two.

Workflow

Using Amped FIVE's *Fourier* filter, the older picture is clarified. Thanks to the Perspective Aligner tool, the perspective of the two images is registered by simply clicking on a few pairs of reference elements that are present in both pictures (road intersections, historical buildings, etc.). The more recent picture is converted to grayscale allowing for direct pixel comparison. Images can then be overlaid, and a difference image is also produced which confirms the good match between elements that remained unaltered in history, while modifications in the questioned building clearly stand out.

Conclusion

By examination of the produced images, changes in the building shape become evident and indisputable. Building owners are prosecuted as responsible for the fatal incident.

TRAINING

Amped Software training courses provide hands-on training on the use of Amped Software products as well as provide insight into the challenges users face in forensic video and digital multimedia evidence processing. Our courses are delivered worldwide by experienced instructors, in-person or live online, in groups with users from multiple organizations or in private organization-specific sessions.

The purpose of the Amped Software training is to:

- Provide students with the theory and the basics of image processing
- Understand the issues affecting images and videos in an investigative context
- Acquire in-depth knowledge of all software features to solve those issues, including the technical and scientific background behind the implemented techniques
- Learn the workflow that is compatible with forensic needs and constraints to take the proper steps to obtain better results
- Work on real cases and learn to testify on the results

AMPED FIVE TRAINING

Forensic Image and Video Enhancement

This is a beginner and intermediate level course designed for users who are seeking to use Amped FIVE for their investigations. Students will learn the fundamentals of image and video analysis and the issues faced when using digital multimedia evidence in investigations. The course is a mixture of lecture and hands-on with many practical exercises to solve real or simulated cases using Amped FIVE. Students will obtain the knowledge and skills required to properly analyze and process images and videos with a workflow compatible with forensic needs and constraints.

This course is offered as In-Person Training or Live Online Training.

AMPED FIVE ADDITIONS TRAINING

Advanced Image and Video Analysis

This is an expert-level course for users previously trained in Amped FIVE and who are seeking to leverage Amped FIVE to improve their investigations. Due to the speed of development at Amped Software, it has been identified that within 12 - 18 months, a user may require a 'top up' to their training. This is a refresher course that allows users to better understand the newly released filters and functionalities of Amped FIVE to ensure the correct interpretation of data and learn to use the new tools to their full advantage. During the course, we also look at advanced techniques and concepts for some of the original filters, such as Aspect Ratio Correction and Photogrammetry. In addition, we also look at cases and discuss, view and analyze challenges faced in forensic image and video enhancement. The course is designed on a modular system, allowing a bespoke personalized schedule dependent on when the original training was received.

AMPED FIVE TRAINING MODULES

The Amped FIVE Training Modules are designed specifically for end-users to acquire more advanced skills and knowledge within technical areas of video forensics. These modules focus on students' needs and the evolving requirements of digital forensics, giving them the opportunity to perform tasks with reachable objectives. The module format allows our users to develop their skills at a pace they set and personalize the areas in which they want to specialize.

Currently, the following modules are available:

1. **Video Evidence Presentation**: learn how to improve the presentation of your evidence ready for court.
2. **Measurements and Speed Estimation**: perform height analysis and speed estimation utilizing photogrammetry and measurement filters.
3. **File Analysis and DVR Conversion**: get acquainted with video extraction from CCTV and other video storage systems.
4. **Amped FIVE Updates**: dive into the latest product updates within Amped FIVE.

More information about each module is available on our website under the Training section.

PURCHASE INFORMATION

APPLICATIONS

Kind of Data	Types of End Users
• CCTV • Body Worn • Dash Cameras • Accident reconstruction videos • Crime scene photos • Digital forensics investigations / personal media • UAV / Drones • Internet search / Open-source Intelligence • Traditional forensics (fingerprints, footprints,document examination, ballistics...	• Law Enforcement Forensic Labs • Covert Surveillance Units • Local Police Departments • Prosecutor Offices • Intelligence / Secret Services • Military Units • Urban Surveillance / Municipalities • Private Forensics and Expert Witnesses • Enterprise Security • Media / News Outlets • Education / Research

MATERIAL AND LICENSING

Amped FIVE is provided as a perpetual or subscription license, delivered electronically. For each license seat purchased the software can be installed on a single machine but used by multiple users. You can easily move the license to another machine by uninstalling it and deactivating the license on one machine before activating it on another. Alternative licensing methods can be evaluated upon request. The perpetual license guarantees that, once purchased, the software will keep working even if the Software Maintenance and Support (SMS) is expired (in that case, the user will lose access to new versions and technical support). On the other hand, the subscription license requires the user to renew the subscription to keep using the product, which is always made available in its most recent version. More information on the license terms and conditions can be found here.

SOFTWARE MAINTENANCE AND SUPPORT (SMS)

Amped FIVE is continuously updated with new filters and additional support for new file formats, therefore the Software Maintenance and Support (SMS) subscription gives you full access to future updates of Amped FIVE as well as access to technical support.

Software upgrades and unlimited technical support via email is always included with the subscription license. For the perpetual license, it is included for one year from the date of purchase. You may purchase additional years of SMS at any time.

For the perpetual license, renewal of SMS is not mandatory, so the license purchased is still valid and can be used even without an active SMS plan. Continued software upgrades and technical support however require the purchase of an SMS subscription plan. The SMS can be recovered even after its expiration, compensating for the missing years.

WHERE TO BUY

Amped FIVE can be purchased directly from Amped Software or through one of our authorized distributors.

AMPED FIVE TECHNICAL SPECIFICATIONS

GENERAL FEATURES

Feature	Description
	Overview
Complete	More than 140 different filters for all possible needs during forensic investigations. Every filter is a solution to a specific technical problem.
Single Solution	Does not require additional plug-ins or third-party software.
Portable	Works on a laptop in the field as easily as on a desktop in the lab.
Reliable	Meets and exceeds the quality standards required by forensic labs and courts worldwide.
	User Interface
Processing Workflow	Add, configure, move, and modify an unlimited number of filters, in real time even while playing video. You can apply real-time, non-destructive image adjustments that don't require re-rendering as changes are applied. Every process is a filter: filters have a common workflow and interaction and can be modified, added, copied, pasted, disabled, or deleted in any moment. Filters chains can be sorted in folders, collapsed, and expanded.
Bookmarks	Bookmarks allow to quickly select interesting frames in a video, or different steps in the processing. Every bookmark is associated to a specific frame of a specific filter and has a name and a description for quick access. Bookmarks can be edited, moved, or deleted and grouped in folders. Images from bookmarks are included in the report.
Tracking	Track areas or target of interest (such as people or objects) through static, dynamic, and manual tracking.
Filters Selection	All local filters support applications on the whole image, a static region, or the tracking of a moving object with either static (more precise) or dynamic (more robust) template.

Configurability	All filters and tools always visible on the screen. Different panels can be resized, moved, docked, and undocked to fit user needs.
Keyboard Shortcuts	Most features of the software are available through keyboard shortcuts, carefully chosen to match those commonly used in standard photo editing software and non-linear video editors.
Theme	Support for multiple themes of different colors in addition to the system theme to fit the user working environment.
Font Size	Customizable font size in addition to the system defined font dimensions.
Log	All operations performed by the user are logged on a text file, together with system info and other critical information. The feature can be optionally disabled.
Pixel Values Visualization	Display current pixel coordinates and values.
Image Statistical Information	Display in real time the histogram and statistical features of the image, on one or multiple color channels. Optionally mark on the image white saturated or black areas to avoid excessive processing.
Selections Tools	Multiple selectors available to best interact with different filters with pixel level precision.
Ruler Tool	To measure distances in pixels and the angle on a picture.
Essential File Information	Current filename, image size and number of frames always visible on screen for quick reference.
Format and Metadata Visualization	Display file format and metadata information, such as EXIF data, present in image and video files.
Zoom Tool	Precise zoom tool with no interpolation to see actual pixels value. Interpolation can be applied under the user control with the specific filter.
Time Calculator	Calculates a time difference or duration between two times or calculates an unknown time using a known time offset. The resulting calculations can be copied to filters requiring date and time inputs, such as Adjust Timestamp or Change Frame Rate.

Video Playback	Advanced video playback with frame-by-frame navigation, adjustable frame rate and jog controls. Includes a special seek function which allows to move on user specified intervals based on units of (frames, Iframes, or different time units). The user can manually input frame number or a time position to quickly move there. Visualization of frame type in videos (I, P, B).
Audio Support	Volume and mute controls when audio is enabled. Playback and encoding support for multichannel audio is included. When changing the speed of a video, either via Change Frame Rate or using the speed slider within the player panel, the audio stream speeds up or slows down accordingly. A smart audio button is located on the player panel, providing icons and tooltips when audio is available but the decoding engine that does not include audio is being used.
Audio Panel	Allows the visualization of the audio waveform during the video playback. It can be found underneath the Player interface.
Integrations	With a single click it is possible to send the current image to Word, PowerPoint or copy it onto the clipboard for pasting in any other tool. It is possible just to copy the image data, the full software user interface, or the whole screen. This makes it very easy and quick to prepare custom reports and instructions for colleagues.
Notes	The Notes panel is always available on screen and the notes are automatically saved with the project. This tool eliminates writing textual investigative notes related to the video onto a separate text file or with pen and paper.
Command Line	The software can be called by the command line or third-party products with various options available.
	Input and Output Formats
Input Image Formats	Supports any standard digital image format (i.e., jpeg, tiff, png, bmp, targa, HEIF...).
Input Video Formats	Supports any standard video format (avi, mp4, mkv, flv, 3gpp, wmv, mov…), also without the need of the codec installed on the system. Expandable by system codecs.

Multiple Video Engines Support	Switch on runtime between different codec frameworks (FFmpeg, FFMS, DirectShow, VideoForWindows, QuickTime) to test different decoding capabilities.
Image Sequences	Multiple images can be loaded together to work on them as if they were frames of a single video file.
Proprietary CCTV/DVR formats	Supports the conversion of most proprietary video formats from video surveillance systems (approximately more than 80% of the formats encountered) to AVI, MP4, MOV, MKV formats. For most of them it is a simple format change which does not involve transcoding and thus quality loss but preserves the quality of the original data. More than 300 formats and their variations are supported, and new formats are added upon request of the users. Optionally, files can be converted to a specific format and codec, concatenated. Batch processing can automatically convert all the files in a folder and optionally concatenate them. The conversion writes a log file with the details of the process. Stream demultiplexing and timestamp extraction are supported for several formats.
Surveillance Server Integration	Some proprietary video formats, as those coming from a Milestone XProtect server are integrated thanks to the official SDK supplied by the producer which also grants direct access to the server data both on recorded images, live images or exported data in native format.
DVR Screen Capture	Integrated screen capture with the option to save standard compressed and uncompressed video files for maximum quality and compatibility.
Convert DVR	Integrated tool for carrying out conversion of proprietary videos into standard playable formats.
Video Input	View, grab and process any stream coming from a DirectShow compatible device.
Export Video	Export the current video frames with any supported FFmpeg, Video for Windows, DirectShow and QuickTime codec and format. If the output codec is H264, it's possible to choose among three different quality options: Default, High and Visually Lossless.
Export PDF	Export the current video frames to a PDF with the number of images per page configurable by the user.

Audio Support	The user can optionally enable the support for audio, which includes playback of the audio stream in video and the copying or converting of the video stream from input to output files.
Project Format	The project format is a simple and readable text-based format that instructs the system on which filters and parameters to apply on specific files. It guarantees transparency, repeatability, and reproducibility of the process, since the processing is reapplied from scratch every time a project is reloaded. Supports multiple images, videos and processes related within the same project workspace. If the input files are missing or have been moved, they can be relocated while loading the project.
Print	Print generated images and video frames.
Automatic Report Generation	Automatic generation of a report containing all the scientific methodology and details of the processing steps, settings, and the bibliographic references to the algorithms in HTML, PDF (optionally protected) or DOC format. This reporting feature is a critical advantage for US users working in Frye or Daubert states. The user can customize different parts of the report such as case, author, description, image size and which frames and processing steps to include in the report, including the images with a proper title and description. It's possible to choose among different templates or to create a customized one.
Export Images	Selected images can automatically be exported from the current project.
Image and Project Snapshots	With a single click of a button the user can save the temporary status of the project (the currently displayed image and the project file needed to recreate it). This allows for a very quick experimentation and to review at a later time different attempts and results. The filename of the snapshots can be assigned automatically or customized by the user.
Advanced File Info	Automatic callback of three different analysis tools (MediaInfo, ExifTool and Ffprobe) to quickly analyze and compare the digital information of image and video files.
File Verification	Supports the visualization and verification of hash codes of input and output files in saved projects to detect unexpected alteration.
Assistant Panel	Provides predefined workflows to assist new users in achieving competency for the most common cases. It also allows for the customized implementation

	of workflows scripts to adhere to agency/organization SOPs (Standard Operating Procedures)
Copy and Verify	Copy of the evidence files verifying the match between the source hash codes and the destination hash codes for a safe acquisition.
	System and Documentation
Compatibility	Runs on any standard PC, with Windows 7, 8, 10, or 11, both 32 bits and 64 bits. Macs are supported via Bootcamp or virtual machines.
Available in 32 and 64 bits	The standard installer includes both the 32- and 64-bits version of the program and the user can switch freely between the two. While the 32 bits version guarantees maximum compatibility with legacy codecs, the 64 bits version can better exploit the user workstation hardware.
High Resolution Support	Support for HiDPI (Retina) screens keeping the proper layout of text and panels.
Licensing Mode	Standalone software provided as subscription or perpetual license, delivered electronically. Alternative licensing methods can be evaluated upon request. Once activated, the software can operate completely offline with no Internet or other network connection. The software installer is provided on the Amped Support Portal as a downloadable file.
Updates	All software updates, both minor and major, are guaranteed when the SMS (software maintenance and support) is active. The SMS is always included with the subscription license. For the perpetual license, the first year of SMS is included with the initial purchase, additional years can be purchased together with the license or later.
Supported Languages	Available in English, Spanish, Italian, Chinese, Japanese, Russian, Polish, Vietnamese, Lithuanian and Arabic. All languages are installed and can be freely switched by the user with a simple restart. Additional languages can be added upon request. Localization includes the user interface, manuals, and generated reports.
Documentation and Tutorials	Complete and in-depth documentation which includes Quick Start Guide, Tutorials, Program Reference Guide, Filter Reference Guide, Keyboard Shortcuts. The Filter Reference Guide includes bibliographic references with ISBN number of books and web links to the scientific papers.

Samples	Includes more than 50 different sample projects and files to learn how to apply the software in numerous situations.
Training	In depth training on the use of the software available worldwide (to be purchased separately, not available for all countries).

AVAILABLE FILTERS

Filter	Description
Load	**Loads image and video files.**
Image Loader	Loads an image from file.
Sequence Loader	Loads multiple images as video.
Video Loader	Loads a video from file or multiple videos all at once.
Milestone Client	Connects to a Milestone XProtect image server to get archived or live images.
Milestone Archive	Loads a video exported from a Milestone XProtect server without need for conversion.
Audio Loader	Loads an audio from file.
Image Paster	Pastes the image from the clipboard for further processing.
Blank Video	Creates an empty video.
Video Input	Live stream DirectShow video sources for real time display or capture. If the chosen codec for recording is H264, it's possible to choose among three different quality options: Default, High and Visually Lossless.
Link	**Connects and mixes different source filters.**
Video Mixer	Overlays or displays two different chains side by side. Supports synchronization of streams and similarity metrics computation.
Perspective Aligner	Display two chains, either side by side or overlaid, and optionally warp one of them to simulate an identical point of view.
Timeline	Displays multiple videos one after the other.

Multiview	Displays multiple chains simultaneously on a grid. Supports synchronization of streams.
Picture in Picture	Displays a smaller image or video over a larger one.
Audio/Video Muxer	Mixes one video stream and one audio stream. Support synchronization of streams.
Write	**Writes image and video files after processing filters have been applied.**
Image Writer	Writes the current image to a new file.
Sequence Writer	Writes all frames as image files.
Video Writer	Writes the current video to a file. If the output codec is H264, it's possible to choose among three different quality options: Default, High and Visually Lossless.
Audio Writer	Writes the current audio to a file.
Select Frames	**Selects video frames.**
Single Selector	Selects a single frame of the video.
Range Selector	Selects frames of the video within an interval with an optional step. Support the trimming of the original video stream without transcoding.
Sparse Selector	Selects a list of frames that are defined by the user.
Remove Duplicates	Removes duplicate frames with the ability to set a similarity threshold.
Iframes Selector	Selects IntraFrames of a video.
Remove Frames	Removes individual frames defined by the user.
Auto Selector	Automatically selects similar frames (to discard bad frames) with the ability to set a similarity threshold and a reference frame.
Demultiplexer	Separates different scenes multiplexed in the same video. Supports the automatic export of multiple channels with a single action. When the output codec is H264, it's possible to choose among three different quality options: Default, High and Visually Lossless.

Motion Detection	Finds events in a video and marks the areas with movement in red.
Deinterlacing	**Processes the interlaced videos.**
Line Doubling	Corrects the height of field-based video.
Interleave	Converts a video with juxtaposed fields into an interlaced video.
Deinterlace	Converts interlaced videos into progressive ones. Supports several options to choose active fields, their order, and the interpolation method.
Field Shift	Aligns the two fields of an interlaced frame.
Edit	**Edits image geometric features.**
Crop	Crops a region of interest of the image.
Flip	Mirrors the image.
Rotate	Rotates the image.
Resize	Resizes the image.
Smart Resize	Resizes the image with a smart zoom algorithm preserving better details.
Resize 1:1	Resize the image to obtain a 1:1 reproduction on the display or on the printed report. Useful for objects such as fingerprints and footmarks.
Frame Size	Resizes the image canvas.
Correct Perspective	Removes the perspective effect on a plane of interest in the image (image rectification).
Aspect Ratio	Corrects the aspect ratio of field-based video.
Undistort	Corrects the geometric distortion caused by capturing optics (barrel and pin-cushion lens distortion). Supports the selection of multiple lines for the estimation of the curvature to compensate.
Correct Fisheye	Compensate the distortion of common fisheye lenses. Supports the selection of multiple lines for the estimation of the curvature to compensate.
Unroll	Converts an omnidirectional image into a panoramic one.

Channels	Color conversion and extraction functions.
Grayscale Conversion	Converts the image to grayscale.
Color Conversion	Converts the image from grayscale to RGB, cloning the three channels.
Color Switch	Exchanges R and B color channels in the image, to correct wrong colors in video.
Extract Channel	Extracts a single channel from the image. The output image has one channel.
Enable Channels	Displays only the selected color channels in the image. The output image has three channels.
Replace Channel	Replaces one color channel of the image with another.
Adjust	**Adjusts image values.**
Contrast Brightness	Adjusts the contrast and brightness values of the image.
Exposure	Adjusts the image exposure.
Hue Saturation Value	Adjusts the hue, the saturation, and the color values of the image.
Curves	Adjusts the tone values following a smooth curve defined by control points. Supports independent modification of intensity and the RGB channels and multiple interpolation modes.
Parametric Curves	Adjusts the tone values by setting the gain in four portions of the luminance range.
Levels	Adjusts intensity and color levels.
Histogram Equalization	Improves the image contrast by uniformly distributing the pixel values. Supports the optimization of a specific region of the image.
Contrast Stretch	Improves the image contrast by expanding the range of intensity values. Supports a sensitivity threshold to tune the filter effect.
Temperature Tint	Manually select the color temperature and tint of the light source illuminating the scene.

White Balance	Adjusts an image to make neutral objects appear gray or white.
CLAHE	Applies a contrast limited histogram equalization, useful on images with high dynamic range (both very dark and very bright areas).
Homomorphic Filter	Adjusts separately the contrast of the illumination and detail in an image.
Retinex	Corrects an uneven illumination in the image using the Retinex algorithm.
Automatic Color Equalization	Reduces color casts and adjusts the contrast using the Automatic Color Equalization (ACE) algorithm.
Extract	**Extracts and analyzes image features.**
Negative	Negative of the image.
Threshold	Thresholds the image values to the desired values. Supports several thresholding modes.
Adaptive Threshold	Extracts the edges with an adaptive thresholding algorithm.
Laplace	Extracts the edges with a Laplacian algorithm.
Sobel	Extracts the edges with a Sobel algorithm.
Scharr	Extracts the edges with a Scharr algorithm.
Canny	Extracts the edges with a Canny algorithm.
Linear Filter	Filters the image with a user-defined kernel.
Bilinear Filter	Filters the image with two user-defined kernels and combines the results.
Channel Mixer	Mixes the ratio of color in every channel as a linear combination of the input image channels.
Color Deconvolution	Maximizes the differences between specific colors in the image.
Component Separation	Separates signals due to different informative components in the image.
Fourier	Removes periodic noise, background, and interferences in the Fourier domain. Useful for latent fingerprints, capture artifacts and electromagnetic interferences in videos.

Verify	**Tools to authenticate digital images.**
File Info	Saves file information and EXIF metadata on the report.
Hash Code	Calculates the input file hash code to check data integrity when loading the project. Supports several hashing algorithms.
Macroblocks	Visualize the macroblock type and motion vectors from a MPEG based video.
Block Difference	Compute the difference between the current and previous frames of a video and hide the blocks with an average difference below a specified threshold.
Measure	**Extracts real-world measurements from images.**
Measure 1d	Takes a measurement on the planar image. Reference and unknown measure must be on the same plane and the plane must be parallel to the image plane.
Measure 2d	Takes a measurement on planar image after perspective correction. Reference and unknown measure must be on the same plane.
Measure 3d	Takes a measurement on the image with a reconstruction model of the perspective. Supports error calculation and multiple measures.
Speed Estimation 2d	Measures the speed and traveled path of an object moving over a flat surface (typically, a vehicle on the road).
Sharpen	**Enhances image details.**
Laplacian Sharpening	Sharpens the image using a Laplacian filter algorithm.
Unsharp Masking	Sharpens the image using an unsharp masking filter.
Denoise	**Reduces the image noise.**
Averaging Filter	Smooths the image with an averaging filter.
Gaussian Filter	Smooths the image using a Gaussian filter algorithm.
Wiener Filter	Smooths the image with a Wiener filter.

Bilateral Filter	Smooths the image with a bilateral Gaussian filter.
Median Filter	Reduces the impulsive noise by applying a Median filter algorithm.
Deblocking	Reduces block artifacts from lossy compression, such as that of JPEG or most video formats.
Deblurring	**Reduces image blurring.**
Motion Deblurring	Corrects the blur caused by linear motion (moving subjects or camera).
Variable Motion Deblurring	Allows to apply to a video a Motion Deblurring effect whose parameters change frame by frame, with optional parameters interpolation.
Optical Deblurring	Corrects the blur of objects that are out of focus (big blur).
Nonlinear Deblurring	Corrects the blur caused by nonlinear motion.
Blind Deconvolution	Corrects the blur of objects out of focus with blind deconvolution (automatic estimation of little blur).
Turbulence Deblurring	Corrects the blur caused by air turbulence on long distances or by high ambient air temperature/humidity.
Stabilization	**Stabilizes video frames.**
Local Stabilization	Stabilizes a shaking video by keeping the current selection steady. The object of interest must be present in all frames. Supports different stabilization modes.
Global Stabilization	Stabilizes the overall scene of a shaking video. Does not need a specific object, but also stabilizes a changing scene.
Perspective Registration	Aligns the perspective of different images of the same object, taken from different points of view. Supports any kind of motion (shift, rotation, zoom, perspective changes).
Perspective Stabilization	Track planar objects (like license plates) moving along a perspective transformation.
Integrate	**Enhances image by multiple frames.**

Temporal Smoothing	Reduces the noise integrating multiple frames. Gives the same number of frames in output as in input.
Motion Smoothing	Reduces the noise integrating current and previous frames and avoiding halos on moving objects.
Frame Averaging	Reduces the noise by creating an image which is the average of all the frames. Gives an output of a single image.
Super Resolution	Generates a single higher-resolution image by merging all the frames with subpixel motion estimation.
Perspective Super Resolution	Compose projections of objects tracked by Perspective Stabilization into a single hi-res image.
Audio	**Add, sync, and redact audio**
Audio Sync	Shifts audio by a specified number of milliseconds or video frames.
Add Audio Stream	Adds an audio stream from file to the current chain (replacing the existing one, if any)
Audio Redaction	Redacts part of the video's audio track.
Presentation	**Prepares a video or image for presentation.**
Compare Original	Juxtaposes or overlays original and enhanced images for comparison.
Spotlight	Adds a spotlight effect to a selection. Supports different tracking methods and inverse selection.
Hide Selection	Pixelates, darkens or blurs an area of interest in a video (redaction for privacy, witness protection, or sensitive subjects). Supports different tracking methods and inverse selection.
Load Timestamp	Displays subtitles on the video frame. Font, color, size and position can be customized.
Add Timestamp	Indicates date and time for the current frame. Font, color, size and position can be customized.
Adjust Timestamp	Allows adjusting timestamps according to several working modes: shift (change the timestamp according to time-offset or international time zone),

	interpolate (add missing Timestamps), and refine (increase the precision of the displayed Timestamp) timestamps.
Annotate	Point and draw tools for adding shapes, arrows, text, images and freehand drawings to video and images. Highlighting a region in the video or image through spotlighting. Redaction in the form of pixelation and blurring is available alongside magnification of an area in the video or image. Choice of colors, borders, strength, transparency and size for all drawn shapes and redaction and level of zoom for magnification. Each annotation can track a specific object/subject, either manually or with software assisted tracking.
Add Logo	Superimposes an external image onto the current image or video to mark it. Supports transparency (alpha) channel or color to transparency conversion.
Add Text	Inserts text on the image. Supports several macros to dynamically change the content of the text. Font, color, size, and position can be customized.
Add Shape	Draws shapes (arrows, lines, rectangles, ellipses) on the image.
Add Grid	Superimposes a grid onto the image or video. Useful for compression estimation and other analysis.
Change Frame Rate	Changes the frame rate of the video.
Convert Frame Rate	Adapts the video frame rate by duplicating or dropping frames, retaining the original speed.
Reverse	Plays back the video in the reverse direction.
Freeze Frame	Freezes a selected frame of a video for a set duration.

HARDWARE REQUIREMENTS

	Minimum requirements	Recommended requirements
CPU	Intel Core i3	Intel Core i5 or faster
RAM	4 GB	8 GB or more
Hard drive space	1 GB free for program files	1 GB free for program files, 10 GB or more for casework files
Screen	13", 1024x768	24" or bigger, 2560x1440 or bigger
Graphic card	No specific requirement	No specific requirement
OS	Windows 7 (32/64 bits) Windows 8 (32/64 bits) Windows 10 (32/64 bits) Windows 11 (32/64 bits)	Windows 10 64 bits Windows 11 64 bits

THE AMPED ECOSYSTEM FOR FORENSIC IMAGE AND VIDEO ANALYSIS

Learn about the full line of solutions that have been developed to assist an entire organization with all investigations, starting from the field, up to the forensic lab, and then to the courtroom.

AMPED REPLAY	For investigators and frontline officers to conduct a first level analysis of their video evidence, with quick and easy conversion, correction, and annotation functions.
AMPED DVRCONV	For technicians tasked with converting a great number of surveillance videos in various proprietary formats, speeding up the triage in cases such as major investigations.
AMPED FIVE	For forensic lab experts to manage the complete image and video analysis workflow, with advanced and fully customizable processes for conversion, restoration, enhancement, measurement, presentation, and reporting, all in a single tool.
AMPED AUTHENTICATE	For digital forensic experts to exploit the data behind digital images. Allowing analysis of image integrity, authenticity, metadata, source and history, and detection of tampering prior to its use as intelligence and evidence.

ABOUT US

SETTING THE STANDARD FOR IMAGE AND VIDEO FORENSICS

OUR STORY

Amped Software was founded in Trieste, Italy, in 2008 by Martino Jerian. While working on his master thesis in Digital Image Processing at the University of Trieste, in collaboration with the Scientific Investigation Department of Carabinieri (Italian Military Police), Martino realized that video processing solutions for forensic applications were poor or non-existent, and not one single product could be found that met all the needs of a forensic analyst. Products offered at the time were a compromise of features or were incomplete and required other products to accomplish common tasks. Therefore, Martino decided to develop Amped FIVE, the company's flagship product.

Amped Software has thus been recognized as an innovator in the national and international arena. In 2008, barely a year from its founding, Amped Software was awarded as the best Italian start-up at the Tech Garage business competition, held during SMAU tradeshow. In 2010, Amped Software was presented in the book "Winning Italy: Almanac of Italian Excellence" by the Ministry of Foreign Affairs, which highlights significant innovation and achievements by Italian companies and individuals. Amped Software was also highlighted as a leader in scientific accomplishments in a world class group which featured prominent companies such as Ferrari, senior "Big Bang" CERN researcher Lucio Rossi, and Lorenzo Thione, the developer of the technology used by Microsoft in the Bing search engine.

OUR FOCUS

Amped Software is committed to help fight crime to keep communities safe, by offering innovative solutions to help convict criminals and protect the innocent.

We are setting the standard for image and video forensics. We focus on developing the most advanced and complete, yet simple and easy-to-use technologies for all image and video processing needs related to forensics, public security, and investigations. With an emphasis on the transparency of the methodologies used, our solutions empower our customers with the three main principles of the scientific method: accuracy, repeatability, and reproducibility. We also invest in research and in the development of best practices to make image and video forensics evolve faster.

Our customers are our number one priority. We continually listen to our customers and adapt and update our solutions in order to meet their evolving needs in digital image and video forensics.

OUR TEAM

Amped Software is made of a team of highly experienced digital forensic experts that use our own software to work on numerous real cases, in which many are of national and international importance. Some team members have also previously served in law enforcement and military. Because of our diverse experience we have a rare insight into how our tools work in practice and are able to emphasize any limitations or missing features for us to improve.

OUR CUSTOMERS

Important forensic labs, law enforcement, government, military, and security organizations worldwide use our solutions. Our products have been sold in close to 90 countries.

OUR PARTNERS

Amped Software has a large worldwide network of distributors. We also have several strategic and technological partnerships with some of the best companies in the law enforcement and video surveillance fields.

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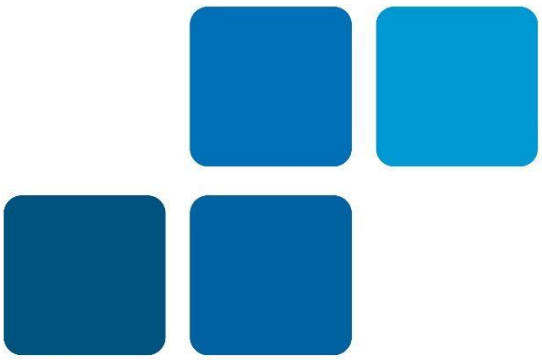

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