FORENSICAGPS™

Advanced 2D to 3D image transformation and analysis means more precise and accurate facial recognition

FORENSICAGPS

POWERFUL & PRECISE FACIAL BIOMETRIC SOLUTIONS FOR LAW ENFORCEMENT

In law enforcement, forensic investigative operations and other security environments there is a crucial need to compare multiple facial images to determine if the images are of the same or different individuals. For fast and accurate digital facial comparison and recognition, professionals use ForensicaGPS.

ForensicaGPS is the most effective digital tool on the market, providing timely, accurate and analytical comparisons of multiple facial images, while also offering assistance in working with victims by producing 3D images of suspects that can be used for visual comparisons.

ForensicaGPS is a unique facial creation and image quality enhancement tool designed to make photos and video frames of a person's face "ID ready" for visual identification or for inclusion within Animetrics FaceR Identity Management Systems (FIMS) or in a third-party face recognition system.

Designed for integration into military, intelligence, homeland security and law enforcement facial identity applications, ForensicaGPS can be easily adapted utilizing its powerful graphical user interface and various facial feature comparator tools and modes.

The application utilizes a global coordinate system (x,y to x,y,z synchronization) for precise comparative analysis of facial features including scars, moles, tattoos and distance measurements between facial features. The application provides controls that allow metric analysis, as well as 2D or 3D visualization of facial structure, geometry and texture. Up to five images of each subject can be compared to the other subject facial images.

Utilizing two subjects, two 3D models are created, allowing both visual and metrical comparisons. ForensicaGPS also allows for the mapping of 2D coordinates to 3D coordinates in context, meaning the final 3D image can be viewed at any angle, making it a complete 2D to 3D comparison solution.

Any 3D model created in the system can also be manipulated for accurate comparisons. The image can be rotated in any plane or used to create a wireframe image that can be overlaid onto a second image for comparison.

Multi-dimensional Transformation

The key to ForensicaGPS' accuracy is the ability to convert 2D data into a 3D avatar that can be rotated and viewed from any angle. To achieve a highly accurate 3D rendering, ForensicaGPS employs Animetrics' powerful and patented FACEngine® software, which employs highly sophisticated mathematical algorithms and applies a unique deformation smoothing process to a 2D facial image and transforms it into a metrically precise, accurate and fully structured 3D avatar.

Comparisons and Visual Analysis

ForensicaGPS leverages its proprietary Anatomic Diffeomorphic Mapping™ for identification, zooming in and closely analyzing the likeness and similarities in one or two facial images in both 2D mode and 3D mode, as well as both metrically and visually. By using the built-in global coordinate system for comparing up to five avatars at once, the ForensicaGPS comparative analysis can accurately
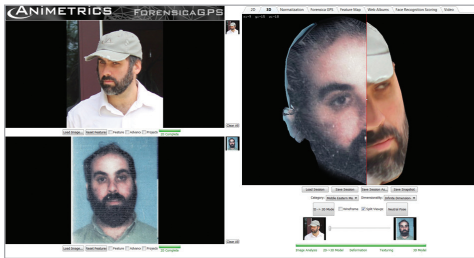
3D transformation from two photos, comparisons and visual analysis

ID Ready - Automatic Pose Correction

replicate standard facial features and unique anomalies. The resulting avatar can be viewed from any angle and compared to other 2D or 3D images. By producing the mapped features in a 3D model, ForensicaGPS also allows recording of facial features metadata such that all two dimensional x and y coordinates are mapped perfectly to their corresponding three dimensional x, y and z coordinates

International and FBI Standards

The Facial Identification Scientific Working Group, FISWG (www.fiswg.com), is developing consensus standards, guidelines and best practices for image-based comparisons of the human face. FISWG members include law enforcement agencies from around the world including the FBI. ForensicaGPS facial comparison tools and processes have been adhering to the FISWG Guidelines for Facial Comparison. ForesnicaGPS uses a morphological analysis as the primary method and provides a user guide for the complete comparison analysis.

ForensicaGPS is a one or two photo comparison and analysis program for forensic facial study that runs on a Windows based PC or workstation computer. It is also available as an ActiveX control for embedding ForensicaGPS into Windows-based applications or within Internet Explorer browsers. All ForensicaGPS controls and GUIs available as separate ActiveX control windows.

Animetrics FACEngine® Technology

Animetrics' FACEngine technology is the engine behind all of Animetrics' facial recognition and face creation systems. FACEngine is an integrated facial recognition technology that is designed to render accurate and useful 3D avatars from 2D images and video, even if the 2D image is not "straight on." The FACEngine 3D model is generated through a combination of an *a priori* mathematical model of faces, advanced image analysis and feature extraction, and advanced techniques for deriving precise pose (or rotation) estimates from an input image.

Technical Specs

Features
- Accepts frontal and profile facial poses ranging from -90º to +90º.
- Smart Texturing – fills occluded facets.
- Automatic feature detection for images at any y axis pose between -90º and +90º and also pose angles in x and z axis.
- Integration of up to 5 images per subject.
- 2D comparison by deforming/overlaying images with a transparency filter.
- 3D geometric comparison via the generation of 3D models from 2D images.
- Nominalization of lighting fields to eliminate shadows in source imagery.
- Single-subject mode for generating a 3D model for a single individual.
- SDK and ActiveX Control available to streamline system integration.
- Automatic or manual landmark input. Forensi-caGPS is primarily designed to operate as an interactive application with the user carefully placing descriptors on features of the face. However, ForensicaGPS can also take advantage of Animetrics' unparalleled facial analysis to automatically place descriptors to enhance efficiency.
- ForensicaGPS allows the manipulation of models for examination prior to exporting an image sequence or video file.
- From the two subjects, two 3D models or avatars are created which can both be visually and metrically compared to each other.
- Provides a Split Viewport function on the 3D

avatar using a window shade effect to pull down or slide across the 3D face at any angle in any direction, allowing for comparisons of specific facial features.
- Uses a built-in global coordinate system (x,y to x,y,z synchronization) for accurate comparative analysis of facial features such as scars, moles, tattoos and distance measurement between selected facial features.
- Able to map 2D coordinates to 3D coordinates at any angle and compare one image or 3D to another image and 3D.
- ForensicaGPS also allows recording of facial features' digital metadata.
- Multiple Rendering Options:
  - Surface Illumination: Adds a lighting effect to the surface of the avatar.
  - Wireframe: Shows the underlying wireframe supporting the avatar.
  - Mask: Displays only the frontal region, or "mask," of the face.
  - Show Features: Displays all visible features defined on the avatar as color-coded points.
  - Show Entire Head: When more than one view is used, this option becomes activated. It will display a full avatar.
- GalleryGen function: Allows the output of a sequence of images of any pose desired for preparation of artistic materials or scientific testing.
- Model Tuning: Allows the parameterization of model generation based on ethnicity, age, or ethnic group providing optimized and more realistic output.

- AVIGen: Allows the generation of an AVI video sequence of an animated head.

Output Capabilities:
- ForensicaGPS supports output to JPEG images files and ForensicaGPS supports the generation of AVI video files. Any DirectShow video filters present on the host machine can be used to encode the output video.
- Output Formats: GTI (native format), DXF, IGS, OBJ, PLY, PNT, STL, and VRML

Input Requirements:
- JPEG or PNG images are supported
- There is no inherent limitation on image resolution. However, ForensicaGPS will not perform resolution enhancement. The quality of the texture maps applied to the model will be consistent with the quality of input images. One megapixel or larger images are recommended.

System Requirements
Software and Hardware Requirements:
- 1.8GHz or faster processor
- Microsoft® Windows® XP/Vista/7 (32-bit and 64-bit versions supported)
- 512MB of RAM (1 GB recommended)
- Graphics support for OpenGL 3.0
- 1,024x768 display (or larger)

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