



Luxand Development
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FaceMorpher Web Edition 1.5

Automatic Face Morphing Toolkit

User Guide

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Introduction

FaceMorpher Web Edition is automatic morphing software designed specifically for online morphing web applications. FaceMorpher WE recognizes the facial features of uploaded photos and creates still images or a morphing animation that can be displayed on a website. FaceMorpher WE runs as a standalone EXE application controlled from the command line and performs the morphing fully automatically.

FaceMorpher supports the following face transformations:

1. Morphing two faces
2. Warping one face
3. Estimating the face of a baby from its parents' photos
4. Making a face look younger
5. Making a face look older

Morphing Process

In morphing animation all features of one person's face are smoothly transformed into the features of another person's face. In other words, the first person's lips are transformed into the other person's lips, his or her eyes are transformed into the other person's eyes and so on. To create such animation, the program has to know the positions of these features in the photos. FaceMorpher WE incorporates the Luxand face recognition technologies to perform this facial feature detection.

FaceMorpher WE gets photo files from the command line, performs facial feature detection (or loads the locations of their facial features from a file) and creates a transformed image or a video file containing morphing animation. The locations of the detected facial features can be saved to a file and can be later used to create animation. It is useful when you need to create several morphing animation video files with one photo or when the detected feature points have to be corrected before the animation is created.

FaceMorpher WE is supplied as an EXE (Win32 executable) file and can be used on the Win32 platform.

Requirements

FaceMorpher WE has the following system requirements:

- Windows 98, Me, 2000, NT, XP
- 128 MB RAM
- 100 MB free disk space

Installation

To install FaceMorpher WE, please run the installation file `FaceMorpher_WE_Setup.exe` and follow the instructions. FaceMorpher WE is installed into the `C:\Program Files\Luxand\FaceMorpherWE` directory by default. FaceMorpher WE is a copy protected software and must be activated with a license key before its use (see the Software Activation chapter).

To access the FaceMorpher WE morphing functions from your application, you need to call `facemorpherwe.exe` from the command line.

Face Image Requirements

FaceMorpher WE recognizes facial features automatically, that is why there are some requirements to photos it can work with. The photo must be taken full-faced and oriented vertically. It must contain the whole face of the person you need, including the head. The face on the photo must not be covered with hands or glasses and it is not recommended that the mouth be open too much. Besides, the photo must be taken in good lighting conditions. For FaceMorpher WE to recognize a face correctly, please make sure that your face images are as close to these requirements as possible.

Using FaceMorpher Web Edition

FaceMorpher Web Edition is controlled from the command line and has a number of command line options. In its normal mode, FaceMorpher WE gets the filenames of two photos, creates morphing animation and saves it to a video file. The parameters of the video file are also specified in the command line.

The command line syntax is as follows:

```
> facemorpherwe.exe <input_image1> [<input_image2>] [options...]
```

Software Activation

FaceMorpher WE is a copy protected software and must be activated with a registration key before its use. The license allows you to use one copy of FaceMorpher WE on one computer, so the software must be registered to a certain computer. To activate the software, you should obtain your Hardware ID running `facemorpherwe.exe` with the `--hardwareid` parameter first. Then you should send this ID to Luxand Development (sales@luxand.com) and pass the received license key file to `facemorpherwe.exe` using the `--activate` parameter. The FaceMorpher WE recognition and morphing functions are not available if the software is not activated. To retrieve the your license information, run `facemorpherwe.exe` with the `--license` parameter. This option returns the name the library is licensed to.

Parameters:

`--hardwareid` – displays your Hardware ID

`--license` – displays your registration information

`--activate <keyfile>` – activates your copy of FaceMorpher Web Edition using the key in the `<keyfile>` file.

Example:

```
> facemorpherwe.exe --hardwareid
```

```
> facemorpherwe.exe --activate mylicense.key
```

Input Photo Options

FaceMorpher WE gets the filenames of photos from the command line. It supports the following image file formats: JPG, PNG, GIF and BMP. Photos are specified in the `<input_image1>` and (if needed) `<input_image2>` parameters.

Facial Feature Recognition

FaceMorpher Web Edition can recognize facial features and save their coordinates to a file.

Parameters:

`--recognize <dotsfilename>` – the name of the file to save the list of the facial feature coordinates of `<input_image1>` to.

Example:

```
>facemorpherwe.exe input_photo.jpg --recognize input_photo.grd
```

This option is useful for warping effects. The common algorithm is as follows: recognizing facial features, shifting them to other positions in your application and calling FaceMorpher WE with the `--warp` parameter.

Example in PHP:

```
shell_exec("facemorpherwe.exe $source_photo --recognize  
$grid_file");  
  
// read the contents of $grid_file, shift the dots and save  
// them to $grid_file_warp  
  
shell_exec("facemorpherwe.exe $source_photo --warp --dots1file  
$grid_file --dots2file $grid_file_warp --outputdir out\ --  
videosize 192x256 --videoframes 100 --frames 10 20 50");
```

Morphing and Warping Animations

To produce morphing or warping animation, you should call `facemorpherwe.exe` with the `--morph` or `--warp` parameter. You should also specify video parameters for the output animation file (see the Video Parameters chapter).

Morphing Animation

Morphing animation is created when FaceMorpher WE is called with the `--morph` parameter. The syntax is as follows:

```
> facemorpherwe.exe <input_image1> <input_image2> [options...]
```

The filenames of the photos are specified in the `<input_image1>` and `<input_image2>` parameters. By default, FaceMorpher WE recognizes facial features and makes an animation. FaceMorpher WE has also a number of options to control the facial feature recognition process.

Parameters:

`--dots1file <dots1filename>` – makes FaceMorpher WE load facial feature coordinates for `<input_image1>` from `<dots1filename>`. If this parameter is omitted, FaceMorpher WE will recognize facial features.

--dots2file <dots2filename> - makes FaceMorpher WE load facial feature coordinates for <input_image2> from <dots2filename>. If this parameter is omitted, FaceMorpher WE will recognize facial features.

Example:

```
> facemorpherwe.exe test1.jpg test2.jpg --dots1file test1.dots
--dots2file test2.dots --outputdir out\ --videoformat flv --
videofilename output_video.flv --videosize 256x392 --
videoframes 200 --framerate 24
```

Warping Animation

To create warping animation, you should call facemorpherwe.exe with the --warp parameter. Warping is performed with a single photo file and two dots files. The first file defines the initial position of facial features, and the second file defines where the dots should be moved. The common algorithm is the following: calling FaceMorpher WE with the --recognize parameter, shifting the coordinates of facial features and calling FaceMorpher WE with the --warp parameter.

FaceMorpher Web Edition comes with a set of predefined dots files defining a deformed face. You can find these files in the Samples\Grids directory.

Syntax:

```
> facemorpherwe.exe <input_image1> --warp <dots1file>
<dots2file> [--warpto <percent>][options...]
```

FaceMorpher will warp <input_image1> using the coordinates specified in <dots1file> and <dots2file>.

Parameters:

--warpto <percent> - defines that FaceMorpher Web Edition should stop the warping at <percent> of the movie. When you use predefined warping grids, it is often useful to stop the warping at 50% in order to achieve good results. This parameter is optional; the default value of <percent> is 100.

Example:

```
> facemorpherwe.exe test1.jpg --warp test1.dots test2.dots
--warpto 50 --outputdir out\ --videoformat flv --videofilename
output_video.flv --videosize 256x392 --videoframes 200 --
framerate 24
```

Video Options

FaceMorpher WE creates morphing and warping animations in the FLV and uncompressed AVI video formats. If you specify that it should create a FLV video file, FaceMorpher WE will first create an AVI file and then convert it to FLV using the third-party ffmpeg.exe tool. FaceMorpher WE can also export still images from the video file into the JPG format.

Parameters:

--outputdir <path> - the path where the resulting video file and still images will be stored.

--videofilename <filename> – the output video file name (optional). If this parameter is omitted, FaceMorpher WE will create only still images.

--videoformat <format> – the required video format. <format> can be either “flv” or “avi”.

--videosize <WIDTHxHEIGHT> – the resolution (in pixels) of the resulting video file and still images.

--videoframes <framecount> – the total number of frames in the video.

--framerate <rate> – the frame rate of the video file.

--framesformat <format> – the format of the still images (FaceMorpher WE currently supports only the jpg file format).

--jpgquality <quality> – a number between 1 and 10 specifying the quality of the still images. <quality> varies from 1 (lowest) to 10 (highest).

--frameprefix <prefix> – defines the prefix for the names of the files with exported still images.

--frames <n1 n2 ...> – defines whether FaceMorpher WE should export the frames numbered *n1*, *n2*, ... from the video file and create the still images “<prefix><n1>.jpg”, “<prefix><n2>.jpg”, ... in the output directory. This parameter should be the last parameter in the command line.

Example:

```
> facemorpherwe.exe test1.jpg test2.jpg --outputdir out\
--videoformat flv --videofilename output_video.flv --videosize
256x392 --videoframes 100 --framerate 24
```

```
> facemorpherwe.exe photo.jpg pattern.jpg --dots1file
test1.dots --dots2file pattern.dots --dots1recognize
--outputdir out\ --videoformat avi --videofilename
output_video.avi --videosize 256x392 --videoframes 200
--framerate 24 --framesformat jpg --frames 10 50 70
```

Face Transformations

FaceMorpher Web Edition employs a set of algorithms to transform the appearance of a face. FaceMorpher WE can rejuvenate a face, make it look older or estimate what a child of two parents may look like.

Baby Face Estimation

To estimate what a child of two parents may look like, you should call FaceMorpher WE with the --baby parameter. FaceMorpher WE will create a still image and save it to a file.

Syntax:

```
> facemorpherwe.exe <input_image1> <input_image2> --baby
--picturefilename <filename> [options...]
```

The resulting image will be saved to <filename> specified in the --picturefilename parameter. The resolution of the image is defined by the --videosize parameter described in the Video Options chapter. It is also possible to use the --dots1file and --dots2file parameters.

Example:

```
> facemorpherwe.exe father.jpg mother.jpg --baby --outputdir out\ --picturefilename child.jpg --videosize 192x256
```

Making a Face Look Younger

To rejuvenate a face, you should call FaceMorpher WE with the --younger parameter. The command line syntax is as follows:

Syntax:

```
> facemorpherwe.exe <input_image1> --younger --picturefilename <filename> [options...]
```

The resulting image will be saved to <filename>. The resolution of this image is specified in the --videosize parameter. You can also use the --dots1file parameter to make FaceMorpher WE load the list of facial feature coordinates from a file.

Example:

```
> facemorpherwe.exe photo.jpg --younger --outputdir out\ --picturefilename young.jpg --videosize 192x256
```

Making a Face Look Older

To make a face look older, please call FaceMorpher WE with the --older parameter:

Syntax:

```
> facemorpherwe.exe <input_image1> --older --outputdir out\ --picturefilename <filename> [options...]
```

The resulting image will be saved to <filename>. The resolution of this image is specified in the --videosize parameter. You can also use the --dots1file parameter to make FaceMorpher WE load the list of facial feature coordinates from a file.

Example:

```
> facemorpherwe.exe photo.jpg --older --outputdir out\ --picturefilename old.jpg --videosize 192x256
```

Sample Applications

FaceMorpher Web Edition is supplied with sample applications written in the PHP language. These applications demonstrate how it is possible to perform online morphing and warping tasks. To run these applications, you need a PHP-enabled web server running on the Windows platform. The applications can be found in the Samples\PHP directory.

Facial Feature File Format

FaceMorpher WE stores the recognized facial features in a plain text file. The first line contains the number of facial feature points in the file. Each of the following lines describes a facial feature and contains two numbers separated by a space – the X and Y coordinate of the feature. The last line contains two numbers and defines the size of the image, from where the dots were taken. These numbers are used when warping transformation is performed.

Facial Feature List

FaceMorpher WE works with 40 facial feature points. The following facial features are stored in the file with the coordinate list.

Facial Feature Name	Index in the list
Left eye	0
Right eye	1
Left eye inner corner	24
Left eye outer corner	23
Right eye inner corner	25
Right eye outer corner	26
Left eyebrow inner corner	17
Left eyebrow middle point	34
Left eyebrow outer corner	16
Right eyebrow inner corner	18
Right eyebrow middle point	35
Right eyebrow outer corner	19
Nose tip	2
Nose bridge	22
Nose left wing	27
Nose right wing	28
Mouth right corner	3
Mouth left corner	4
Mouth top	20
Mouth bottom	21
Mouth left top coordinate	36
Mouth right top coordinate	37

Mouth left bottom coordinate	38
Mouth right bottom coordinate	39
Chin bottom	29
Chin left	14
Chin right	15
Face contour 1	12
Face contour 2	30
Face contour 3	32
Face contour 4	10
Face contour 5	8
Face contour 6	6
Face contour 7	5
Face contour 8	7
Face contour 9	9
Face contour 10	11
Face contour 11	33
Face contour 12	31
Face contour 13	13