# A Basic Knowledge of Image Morphing

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*Abstract:* **The term "morphing" is used to describe the combination of generalized image warping with a cross-dissolve between image elements. The term is derived from "image metamorphosis". Morphing is an image processing technique typically used as an animation tool for the metamorphosis from one image to another. The idea is to specify a warp that distorts the first image into the second. Its inverse will distort the second image into the first..The morph process consists of warping two images so that they have the same "shape", and then cross dissolving the resulting images. Cross-dissolving is the major problem as how to warp an image. In this paper I have concentrated on one of the methodology of image morphing named "Mesh Warping".**

*Keywords***: Morphing, Warping, Cross-dissolve, Metamorphosis.**

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## I.INTRODUCTION

Morphing can be defined as an animated transformation of one image into another image. Morphing involves image processing techniques like warping and cross dissolving. Cross dissolving means that one image fades to another image using linear interpolation. Morphing applications are very easy to find. Film makers from Hollywood use advanced morphing techniques to generate special effects. Even Disney animations are made using morphing, for speeding production. Because there are a small number of applications to generate face morphing, there is an increased interest in this domain. *Image metamorphosis*, or image morphing, denotes interpolation between images of different objects from (user defined) correspondences alone, i.e., without any additional information such as geometry or camera calibration. Image morphing techniques have been widely used in creating special effects for television commercials, music videos such as Michael Jackson's *Black or White*[1], and movies such as *Willow* and *Indiana Jones and the Last Crusade*[2].

## II. PROCESS OF MORPHING

### A.   *Metamorphosis*

The word metamorphosis has its origins in the greek language. The common meaning of the word in a dictionary is a change in form or nature [9]. "In insects a complete change in form as the insect progresses from one developmental stage to another"

**Shape Change in Nature:** A typical example is a plant: a single seed grows into a complete tree, with stems,



leaves. [10] .The sequence of illustrations in fig shows a metamorphosis from an aquatic tadpole to a terrestrial adult frog.
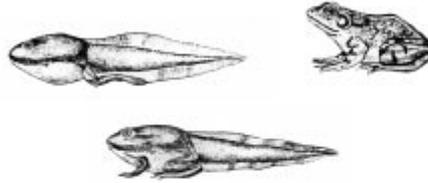
**Frog metamorphosis**

Inanimate things may also have their shape changed under the action of external forces.These forces include environmental phenomena, such as wind, rain and lightning, as well as, other processes such as mechanical impact, combustion reactions, etc. Figure shows the deformation of a tube that was bent over another tube. Depending on the material properties of the object, some deformations may be permanent and others temporary. This classes deformations as *elastic* and *inelastic*.

**Example:** deformation of tube Uses of Shape Transformations:-Shape transformations have many uses in applications that deal with animation, modelling and analysis of forms.

### B.Image Morphing

"Morphing is an image processing technique typically used as an animation tool for the metamorphosis from one image to another." "Image morphing is a special effect in motion pictures and animations that changes one image or shapes into another through a seamless transition"

### C. Methodology of Image morphing

### 1. Cross Dissolve

When the shape of two graphical objects *A* and *B* are isometric, it is possible to use a rigid motion of the space (isometric) to align the geometry, superposing the two objects. After the geometry alignment it is possible to obtain a simple metamorphosis transformation between the two objects by using linear interpolation of their attribute functions. This metamorphosis is called a *cross-dissolve* of between the two objects.



### 2. Warping
In general there exist two different ways of image warping.
  - **Forward Mapping: -** "Forward Mapping scans through the source image pixel by pixel, and copies them to the appropriate place in the destination image [1]". It is used in point-morphing algorithm.
  - **Reverse Mapping: -** "Reverse Mapping goes through the destination image pixel by pixel, and samples the correct pixel from the source image. The advantage of this algorithm is that every pixel of the destination image gets set to something appropriate [1]." It is used in line morphing algorithm.

### D. Mesh Warping

The mesh-warping algorithm relates features with non-uniform mesh in the source and destination images, i.e., the images are broken up into small regions that are mapped onto each other for the morph.
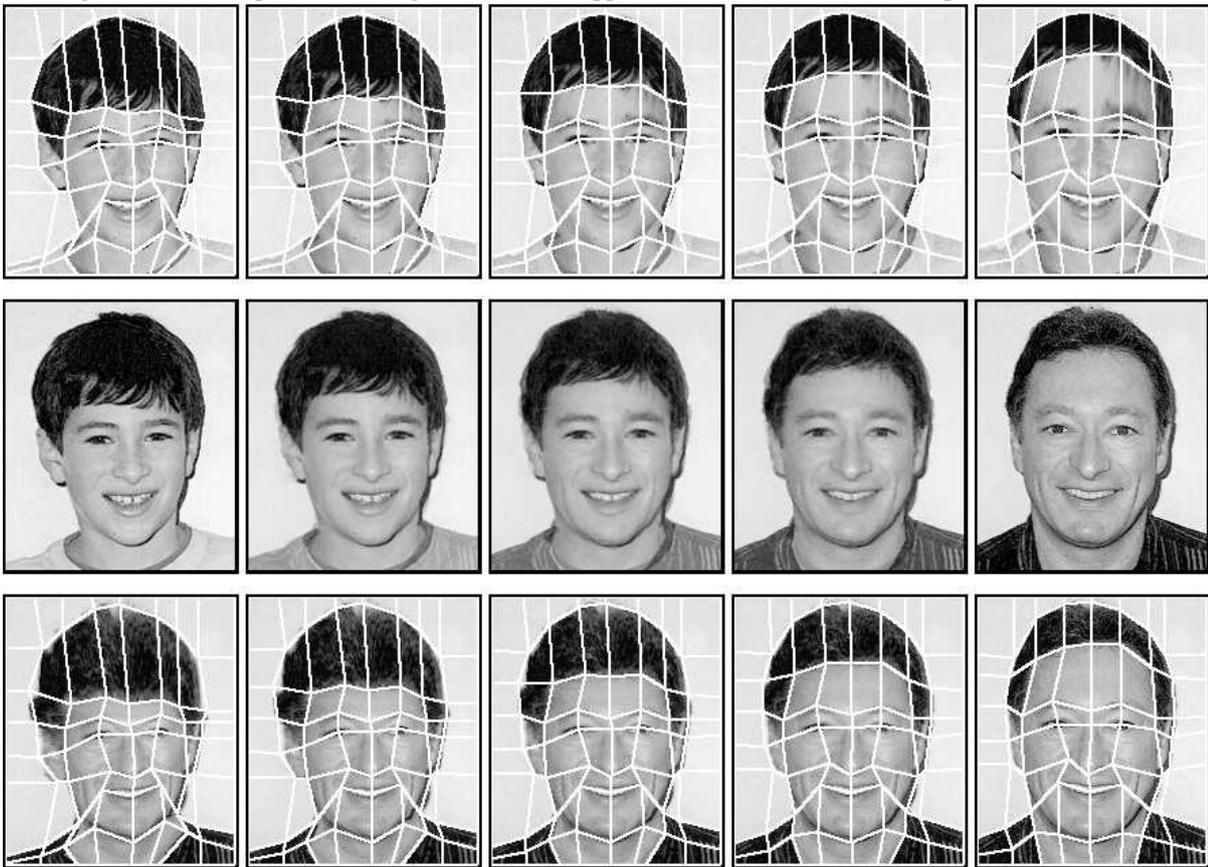


**Figure 1 Mesh Warping**

> **Explanation of Mesh Morphing algorithm: -** The Mesh Morphing algorithm has been implemented as our paper. We have divided our project into following steps explained below.

**Step 1: -** Loading of Two Images
1. getImage(),
2. createImage(),
3. PixelGrabber class including functions getPixel() and grabPixel(),
4. drawImage().

**Step 2: -** Getting Corresponding Points ControlPoint c=new ControlPoint(X1, Y1, X2, Y2)

**Step 3: - Creating the Mesh** Triangles is formed by the **morph ()** function as a intermediate step. The Triangle is formed by the instance of **Triangle** class which takes a parameterized constructor as the values of the instances of **ControlPoint** class. The particular triangles are then split into 22 **Simple Triangle** i.e. the Triangle which has the linear base ( two of the coordinate of the three point Triangle have the same 'y' coordinate).

**Step 4: - Getting The Number Of Frames** This step will be implemented by clicking the particular Menu Item. More the number of frames, clearer will be the sequence of the morphed images when we see the video( as the sequences of the morphed image).The number of frames will be entered by the user with the help of a dialog box opened asking for the same.

**Step 5: - Intermediate Points** Intermediate points are the points which are formed by mapping the corresponding points of Imagesrc and Imagedest

**Step 6: - Generation Of The Morphed Images** This function is implemented by the **morphtriangle1()** and **morphtriangle2()** function, which basically interpolate the pixel values at both the images and assign the value to the intermediate image.

**Step 7-: - Displaying The Morphed Image** This images generated in the previous step would be displayed in the sequence with the **drawImage()** function.

## III. FUTURE WORK

A composite image is treated as a metamorphosis of selected regions in several input images. The regions seamlessly blend together with respect to geometry and colour. In future work, we will determine the extent to which the technique produces high quality composites with considerably less effort than conventional image composition techniques. Model-based vision should be able to exploit knowledge about the relative position of these features and automatically locate them for feature specification [5]. Currently, this is an active area of research, particularly for compression schemes designed for videoconference applications. The same automation applies to morphing among two video sequences, where time varying features must be tracked.

## IV. CONCLUSION

The above paper has successfully implemented Image Morphing using Mesh Warping algorithm combined with the cross dissolving technique. The algorithms used were fast and intuitive, which efficiently computed the mapping of each pixel from the source image to the destination image. The mesh was formed of triangles obtained from the manually specified control points. It was noticed that more the number of frames better were the morphed results.

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