Implementation of Sprite Animation for Multimedia Application

Ms. Yi Mon Thant

***Abstract*—**Animation is simply defined as the sequencing of a series of static images to generate the illusion of movement. Most people believe that actual drawings or creation of the individual images is the animation, when in actuality it is the arrangement of those static images that conveys the motion. To become an animator, it is often assumed that needed the ability to quickly design masterpiece after masterpiece. Although some semblance of artistic skill is a necessity for the job, the real key to becoming a great animator is in the comprehension of timing. This paper will use a combination of sprite animation, frame animation, and some other techniques to cause a group of multi-colored static images to slither around in the bounded area. In addition to slithering, the images will also change the color of different parts of their body, much like the real world creatures that have this amazing ability to change the colors on their bodies do. This paper was implemented by using Java 2 Standard Edition (J2SE).

It is both time-consuming and expensive to create animations, regardless if they are created by hand or by using motion-capture equipment. If the animators could reuse old animations and even blend different animations together, a lot of work would be saved in the process. The main objective of this paper is to examine a method for blending several animations together in real time. This paper presents and analyses a solution using Weighted Skeleton Animation (WSA) resulting in limited CPU time and memory waste as well as saving time for the animators. The idea presented is described in detail and implemented. In this paper, text animation, vertex animation, sprite part animation and whole sprite animation were tested.

In this research paper, the resolution, smoothness and movement of animated images will be carried out from the parameters, which will be obtained from the experimental research of implementing this paper.

***Keywords*—**Weighted Skeleton Animation

I. Introduction

ANIMATED movies and television cartoons have been around for decades, but it is only in recent years that animated graphics have become commonplace in other areas. Perhaps not surprisingly this has coincided with the digital revolution, and animation has made its mark all over the Internet (advertising, logos and icons, avatars and 'emoticons', email, online games and cartoons), as well as in desktop software, mobile phones and PDAs, computer games and virtual reality environments, CAD, simulation and visualization. This ubiquity has been accelerated by the ready availability of affordable user-friendly software, smaller file sizes, and faster network connections. The fact that animation is the first choice for online advertising has also played its part.

Producing animated graphics are used to be limited to highly skilled professional animators, and of course at the professional level (film-makers, designers), it is still a highly skilled craft. However, just as handheld camcorders and free software have brought movie-making and video production to the masses, so readily available animation software has given everyone the means to create animated graphics. [1]

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II. Methodology

A. Animation Techniques

There are many different types of animation, all useful in different instances. However, for implementing animation in Java, animation can be broken down into two basic types: frame-based animation and cast-based animation.

Frame-based animation is the simpler of the animation techniques. It involves simulating movement by displaying a sequence of static frames. Cast-based animation, which also is called sprite animation, is a very popular form of animation and has seen a lot of usage in games. Cast-based animation involves objects that move independently of the background. [2]

B. Methods of Animation

To animate complex objects, such as the human body, today's 3D games mainly use two different methods: Vertex Animation and Skeleton Animation, abbreviated in this paper to VEA and SKA. VEA animates the mesh directly while SKA animates a mesh through a skeleton.

The main advantage of VEA is total freedom for the animator when creating the animation. Some major disadvantages are that the animation data is huge in size even when compressed, and is inflexible since the animator must decide on the maximum animation frame rate when exporting the animation.

To decrease the size of animations and to make interpolation easier, Linked Skeleton Animation (L-SKA) is widely used today. The two main advantages with L-SKA are a radically decreased data size compared to VEA and the fact that the computation load is still cheap. Another advantage is the ability to interpolate in-between frames. The greatest disadvantage is the visual errors.

To remove the visual errors of L-SKA, Deformed Skeleton Animation (D-SKA) is used to bind the skeleton to the mesh is used. The advantages of D-SKA over L-SKA are visual improvements and less data size. Two disadvantages exist. The first is the increased computational cost compared to L-SKA since all vertices bound to more than one bone must be transformed one time for each and every bone. The second is the fact that some meshes still might experience strange deformations in extreme positions if too few vertices are used near the bending joint.

The VEA memory usage has been calculated as the number of vertices multiplied with the number of frames in the animation loop. This number is then multiplied with 12 as in the size of three floating-point precision numbers.

The SKA memory usage has been calculated as the number of bones multiplied with the number of frames in the animation loop. This number is then multiplied with 16 as in the size of four floating-point precision numbers. [3]

C. *Weighted Skeleton Animation*

In this thesis, Weighted Skeleton Animation (WSA) is mainly used. WSA is used to blend several animations together without jerky motion between frames or different animations. The human eye is very astute in noticing jerky or unnatural movement, especially in human characters, and it is therefore important to remove such behavior in an animation system.

Jerkiness in a skeleton animation system can be defined as movement of bones in too large steps between frames, or movement of bones at different speeds during a short time. The first case occurs when the computer has a constant low frame rate and the second case when frame rate changes quickly or when an animation makes alternating quick and slow movements.

The problem with D-SKA is that not enough information is available to enable blending. WSA solves this problem by attaching a weight to each bone that tells how important it is in the overall animation. [4]

D. *Frame Rate and Timeline*

For animation system, frame rate and timeline are the main parameters. The standard frame rate is 12 fps (frames per second). The higher the frame rate is defined, the faster the animations speed is. Similarly, the lower the frame rate is defined, the slower the animation speed is. The more timeline is defined, the smoother the animation is. Similarly, the less timeline is defined, the rougher the animation is. The frame rate and timeline can be changed as wish. The frame rate can be change in different application. [5] The frame rate for different application is shown in table 1.

TABLE I
FRAME RATE FOR DIFFERENT ANIMATION

Animation	**Frame rate**
Sprite animation	10 fps
NTSC TV	30 fps
PAL TV	25 fps
Film	24 fps
DVD-Rom	15-30 fps
Broadband Internet	30 fps

E. *Overview of Animation System*

The overview flowchart of the animation system is show in Fig. 1. The following procedures are processing steps for animation system. The program was started choosing the type of animation. If text animation was chosen, required parameters were specified. And text style was edited as wish. And then, text animation can be animated and displayed after editing. If vertex animation was chosen, object was created as wish and required parameters were added. And then, object was animated using vertex skeleton animation.

If sprite part animation is chosen, required images were added and edited as wish. Then, sprite part was animated using weighted skeleton animation. The whole sprite animation is similar as sprite part animation. It is also animated using weighted skeleton animation.

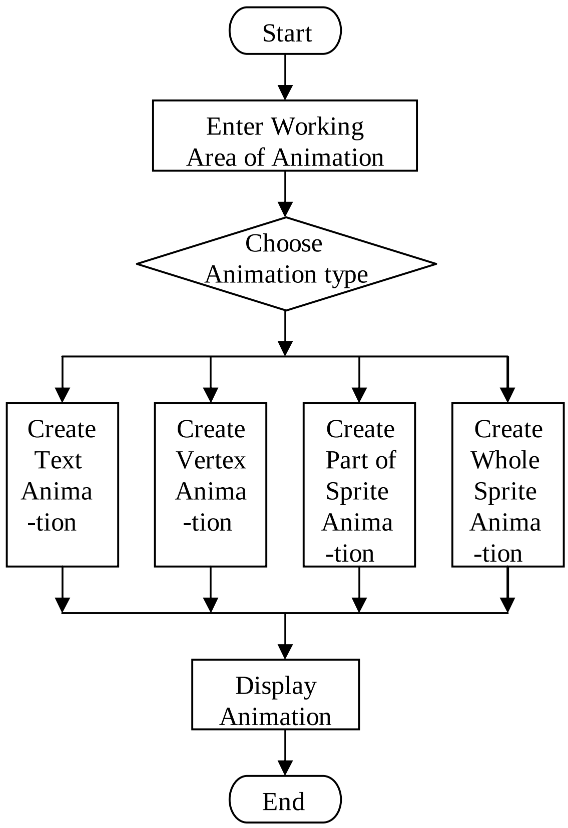

Fig. 1 Overview flowchart of the Animation System

III. Tests and Results

In this paper, sprite animation was tested. Sprite animation was tested using weighted skeleton animation. For sprite animation, the background image was firstly added. The background image is still image. Then, the sprite images were added to animate. The required resources were also added and linked together by flow window. To edit the resources, the track window is used. Finally, the sprite animation was displayed. The flowchart of sprite animation is shown in Fig. 2. The sprite animation can be used in game, advertising and cartoons. When this animation is combined with sound, it can be used for multimedia application.

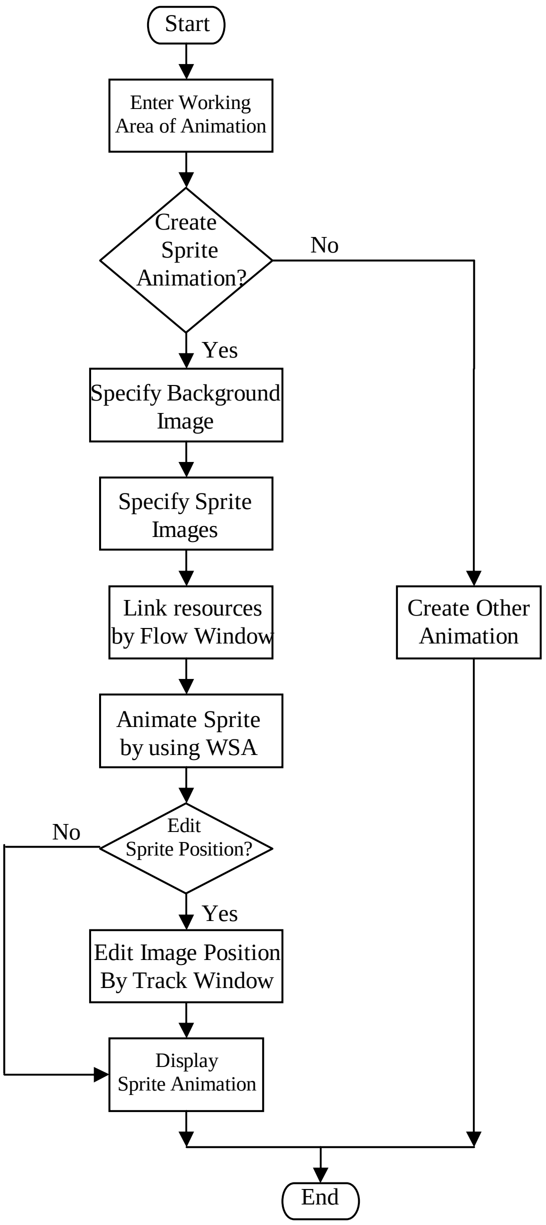

Fig. 2 Flowchart of Sprite Animation

The working area for animation is shown in figure 3. The image of house was use as the background image in figure 4. For sprite part animation, the tail of a dog, the wings of a bird and the leaves of a tree were used to animate. The animation of the tail of a dog is shown in figure 5 and 6. The animation of the wings of a bird is shown in figure 7 and 8. The animation of the leaves of a tree is shown in figure 9 and 10. For whole sprite animation, the air balloon and the toys were used to animate and shown in figure 11 and 12.

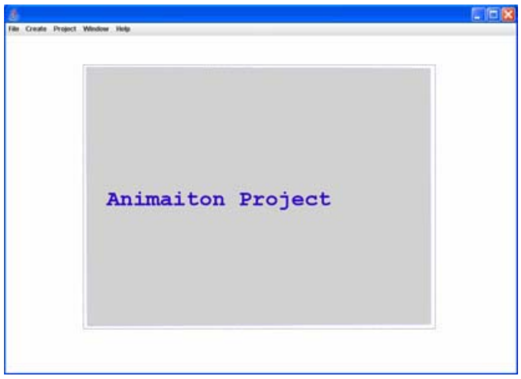

Fig. 3 Working Area of Animation

Fig. 4 Background Image

Fig. 5 First position of the tail of dog

Fig. 6 The second position of the tail of dog

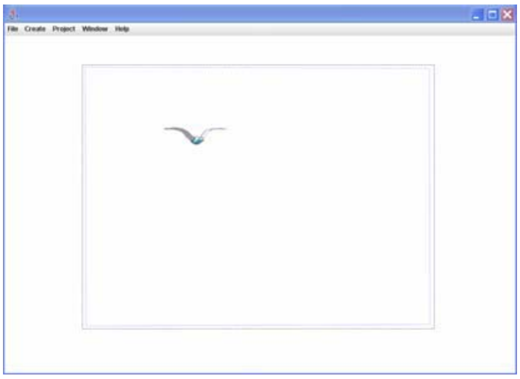

Fig. 7 The first position of the wing of bird

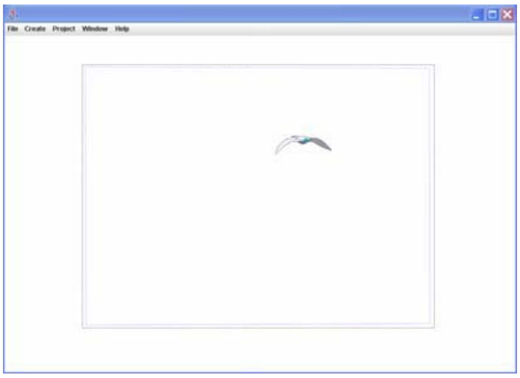

Fig. 8 The second position of the wing

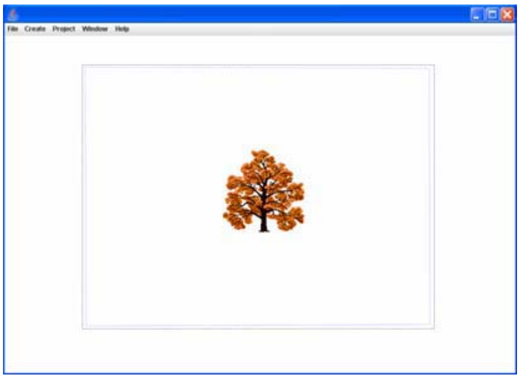

Fig. 9 The first position of leaves of tree

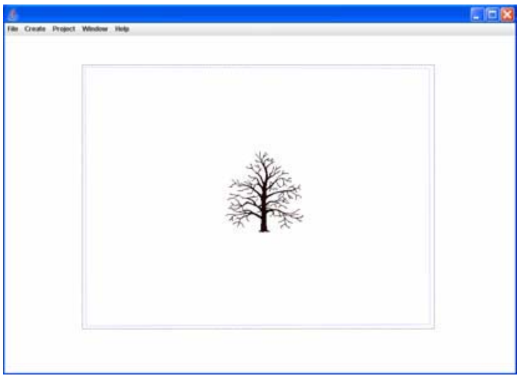

Fig. 10 The second position of leaves of tree

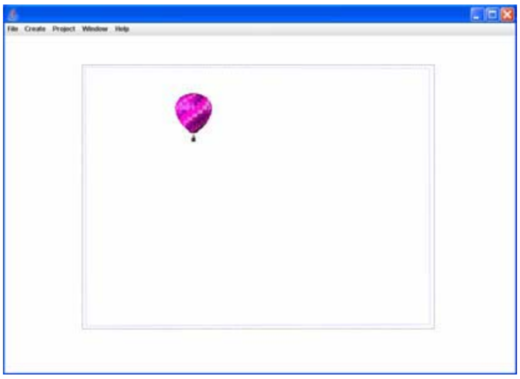

Fig. 11 The balloon for whole Sprite Animation

Fig. 12 Toys for whole Sprite Animation

IV. Conclusion

Animation is the illusion of motion that is created by displaying a series of images or frames, each one slightly different from the last, over a brief period of time. To update the screen multiple times per second, it is needed to create a new Java thread that contains an animation loop. The animation loop is responsible for keeping track of the current frame and for requesting periodic screen updates. To implement a thread, it must be either created a subclass of thread to runnable interface.

The controlling class extends the Frame class and implements the runnable interface. Thus, an object of the controlling class is used to provide the visual manifestation of the program as a visual Frame object. An object of the controlling class is also suitable for using as an animation thread, which controls the overall behavior of the animation process.

In this paper, the resolution, smoothness and movement of animated images will be carried out from the parameters, which will be obtained from the experimental research of implementing this system. The main objective of this paper is to examine a method for blending several animations together in real time. This paper presents and analyses a solution using Weighted Skeleton Animation (WSA) resulting in limited CPU time and memory waste as well as saving time for the animators. The idea presented is described in detail and implemented. In this paper, text animation, vertex animation, sprite part animation and whole sprite animation were tested. The sprite animation can be used in game, advertising and cartoons. When this animation is combined with sound, it can be used for multimedia application.

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