Graphics and Multimedia (COMP3419)

Assignment Option 1

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Chapter 1

COMP3419 Assignment - Option 1

1.1 Introduction

The assignment task was to program a short video involving digital video processing, compositing and 2D animation techniques. The output video is a piece of animation based on a provided video clip. The video provided was one of a marionette monkey moving around the screen with red markers on its hands, feet and body. The markers would be used to create the animation for the composed image.

1.2 Implementation

The assignment was implemented using Processing with the Java programming language. Images were formatted in png and sound files were formatted in wav. The task was split into stages. The first stage was to extract the images from the given movie file. The second stage then was to loop over each saved image and replace the multi-coloured image with a binary representation of the image with white representing the desired red colour and black representing any undesired colour.

After the images have been made binary the next stage was to split the screen up into blocks and search for the blocks with the highest score (highest score is the block with the most white pixels). Then the blocks with the five highest scores are determined to be the arms, legs and body of the monkey.

Then the hardest stage was to determine which of the five highest scoring blocks was to be allocated to which matching body part. As such this implementation found the top-most and left-most high scoring block and allocated it to the left arm and so on and so forth for the other limbs.

Then next stage was then to transpose the picture onto the capture animation. This was easily done by first drawing a dynamic background then drawing the matching images for each body part in the locations of which they were found during the movie.

Then the final stage was to add extensions of which in this implementation include randomly moving allies that when colliding with the hero can power up the hero and play a sound, enemies that can be displayed on either side of the hero and can fire blasts that explode upon impact with the hero and randomly moving clouds to make a dynamic background.

1.3 Observations

Whilst completing the assignment many observations were made as to what would be an effective way to implement the algorithm and some of which were not able to be implemented due to time constraints, however, are included in a dot point list so as to provide readers with inference for future work:

- The implementation searched each block in each frame for the five highest scoring blocks, however, a more efficient and potentially more optimised approach would be to search a radius around the previous allocated body part found in the previous frame.
- The implementation is simply using stages, however, the algorithm could just as easily apply by going through frame by frame and pausing to produce the output in real time.
- The implementation could have better used object oriented design principles such as flyweight so as to make more efficient the displaying of multiple shared resources.

1.4 Conclusion

In conclusion the analysing of frames to determine movement and in particular movement attributed to specific sources is a tricky task with graphics programming. The task is particularity trick due to the nature of pixels being the same or akin colours. As such when two sections being track cross paths it is very hard to determine which direction they go when they separate. Inference can be made suggesting the speed at which they move towards each other and by looking ahead and determining what location they are at in the future. Since, in this task the objects being track were legs further investigation could be done of future frames to know which way the legs are moving and therefore the problem could be solved, however it would take a large amount of resources and would likely double the processing time.

This task, however, with limitations was achieved with great success and with minor tweaks was able to produce a video that captures the animation provided by the marionette monkey and add extensions that brought the video to life.