



AUTOMATED CHARACTER ANIMATION TOOL

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Abstract— Developing an Animation tool kit that allows the Animators and Game developers to input the typed text that should be spoken or do by an Animated Character figure. The output will be appropriate synchronized nonverbal and verbal behaviors with synthesized speech .This will considerable decrease the time of total production for medium animation and game productions where frame by frame detail animation by the animator's not needed and to animate the characters without any detailed professionalism in animation. The possibility of developing entertainment app or interactive games for smart phones is another advantage of this system. This system cannot be a substitute for high end cartoon films and Hollywood animations where reality and expression is highly dynamic and perfect. Games that rely too much on motion capture is also cannot be replaced by this system.

Keywords- Artificial intelligence, Game development, Automated character Animation, Robotics and Entertainment App

I. NON VERBAL BEHAVIOUR

Appropriate synchronized nonverbal behavioral animation for the typed text input by the animator motivated to analyze human behavior. From the Animator perspective when he is assigned to animate a character the first step is to understand the personality of the character that assigned to animate.

Personality is one of the key to crack nonverbal behaviors. Every dialogue that the animator input as text is spoken by a character with some personality. The nonverbal behavior of that character starts with a particular gesture or pose. This key pose is directly influenced by personality and the emotion of the context. A goofy unconfident character will have a different pose from a confident character for the same dialogue. Animators use this technique to limit the number of poses for a particular character.

We have to do very strong and rigid pose for superman like character for a dialogue like ' **I am fine**'. But have to give very unconfident pose for a lazy weak character by made his back bent like arc for the same dialogue '**I am fine**'. The facial expression of both the characters is also distinct .

This difference is a guideline to limit number of possible animations for a particular character.



RIGID CONFIDENT GESTURE

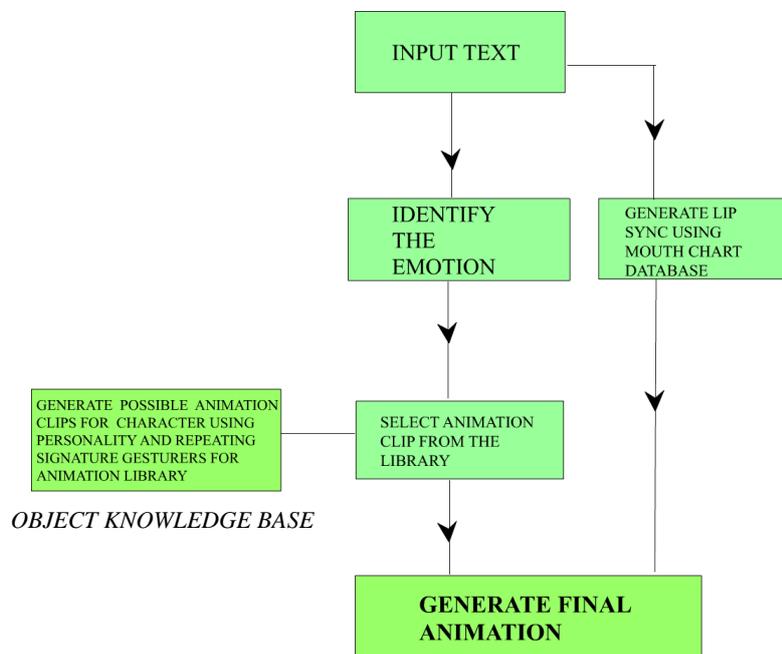


WEAK GOOFY GESTURE

II. KNOWLEDGE BASE SYSYTEM

The Task of identifying the emotion for a particular input text itself is a program module. Once an animator defines the Key pose, the accompanying various secondary actions is easy to develop. Human’s tendency to repeat the certain personnel gestures can use here. In traditional method animators keep a collection of animations for each character. Whenever the character is angry animators use the same action previously used for the angry emotion and change the lip sync. A shy lady always smiles with hands close to her body. It conveys the shy personality; whenever she smiles we can use the same action repeatedly as it easily conveys personality. It also helps to update the library animation to the extent of reality and perfection the system wanted.

Fig1: CAT SYSTEM WORK FLOW



The Figure 1 shows the work flow of Character Animation Tool kit

III. CAT SYSTEM

- Object knowledge base of the CAT has to store the personality of the character and its characteristics or identity
- The action knowledge base has to store different actions or library of animation for each emotions .Here whenever a particular emotion is called for action. One of the predefined library animations for that emotion will be called.
- Lip-sync is independent of this action. It is generated in a different module using the mouth sub object of the character.
- Most of the program logic is to Analyze the words of the sentence to find the emotion it conveys.
- Interface is made up of characters with the selected scene .Two text input boxes with one dedicated to the dialogue character is speaking and other dedicated to input the text to indicate any action like run, jump etc. character is performing.

IV. GESTURE ANIMATIONS

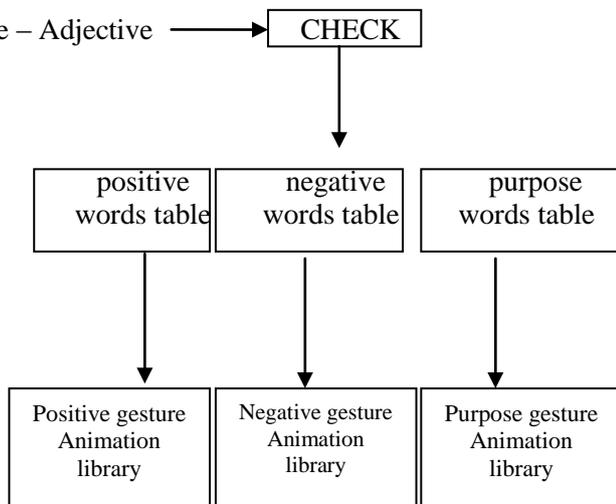
After the typed text the first basic step is to identify the emotion by using the words in the sentence. In the given example

‘**I am fine**’ the word ‘**fine**’ shows that the character is in positive mode. A database with tables to store the words for different attitude or mood is needed.

I ---- noun

Am – verb

Fine – Adjective



Some situations can easily cheat. A sad character can also said ‘**I am fine**’ in a negative way. Here Facial and pose of the character makes audience understand he said in negative way. One solution is to input a smiley face or sad face symbol along with the input text as use in mobile text messages.



Example : I AM FINE

Further division in positive attitude table is also possible according the level of positive mood the word depicts. We need a subset of library Animations for each emotions like angry, Happy, Surprise, fear, shy etc. For example let's have three functions Shylady.Happy(1), Shylady.Happy(2), Shylady.Happy(3).Here the first function calls for less happy emotion. Second more happy, Third Happiest action. Emotional module should have to handle multiple emotions in a single sentence. In the sentence 'What is that? Oh my god it's a bomb!'. Two emotions are working under a single sentence .This should be manipulated by using symbols that break sentences.

V. ACTION ANIMATIONS

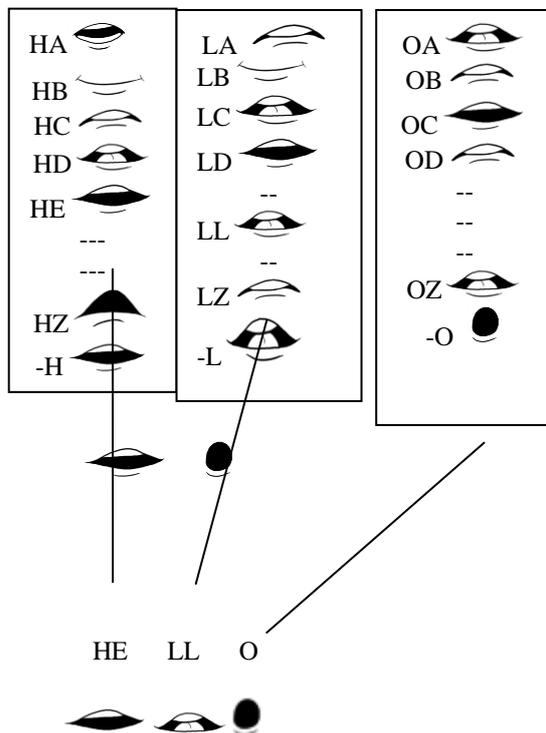
Action animations like walk ,run kick etc. are common and frequent activities of character. So creating a library of such animations is easy. But we can't put all possible actions a character can go through. Whenever animator is not able to find a corresponding action for the input text the system has to inform it. The animator has to do that animation and the system automatically keeps the copy of that in Library for next use.

VI. SPEECH SYNTHESIZING

When work on 2d Animation Animators rely on mouth chart. They cannot hear sound in real-time but do Animation rely on mouth chart. A set of particular mouths is assigned for each word. Usually director provides Xsheet to depict mouths for each word the character spoke. Xsheet also gives the timing where this mouth should come. The words can be automatically mapped to corresponding mouths by using a database. In the given example mouth for the word 'HELLO' can generate like below

HELLO – HE, LL, O (separate the word into sets of 2)

The next step is to look up H, L and O tables like given below



The tone of each word is different in different instance. The sentence '**I got it**' can be fast if the listener is near to character or very loud and lengthy if the listener is far away .Lip sync this difference is important. . In comics they use text to emphasis this difference. Previous sentence will be like '**I goooottt it**', if it is loud. Generate the lip-sync for this reformed sentence is easy. Similarly if the character has to emphasis a particular word in a sentence it can be shaded or italics. Animators usually make a major change in character pose during this emphasized word. To tackle this scenario there should be a control on selected animation for the execution of key pose or nonverbal behavior. An easy way is to start the lip sync in a **base pose** that convey the character personality and mood and start the main action from the emphasized word.

Animators used a common rule of mouth change in every three to four frames for normal dialogue. Each lip sync starts in two frame delay after mouth open and end two frames after the dialogue stops. These time guidelines can be used to generate a lip sync of each word of a sentence.

VII. CHARACTER RELATION

If an animation involves more than one character. The character that is listening is on moving hold. It is in a neutral pose but will be on a certain personality pose. The transition from a particular emotion or pose to another pose to respond automatically is challenge. Usually in animation it is easy .But automatically change to different pose without jerk needs some research .One probable solution is to use one common pose as transition for different emotional and physical action. May be all actions are start from one of this base poses. In order to change from one action to another action the character has to move to this basic pose first.

The relation between different characters in a system is to be documented and put in object knowledge base. Like in real world every character responds to other character in according to the relation and circumstance. When animator input the text he may have to put the name to which the character is communicating and behavior module generate appropriate action in accordance with the relation and emotion derived from the module. Son communicate to the father is using a different gesture when compared to his communication with his friend.

VIII. CONCLUSION

Detailed study of data structures for this system is needed which is directly related to the algorithms to process the input text. The system demands the animator to define objects. As the objects are created graphically by Animators the system has to store it, which will later hide Animators from program details or knowledge.

Procedural animations in Flash program have many direct tools for animation .It also have strong functions for library and object management. Maya Mel script is also powerful in 3d software's for procedural animations. These softwares can use for testing the logic and implementation.XML is also good for platform independent implementation as a Tool kit.

The CAT system can speed up the limited animation projects in both 2d and 3d studios. It will help new animators to keep up with the old animators. CAT system can use in games extensively. CAT system can also be used in robotics and Artificial intelligence.

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