SUMMARY

[0008] In an ~~first~~ aspect, the present disclosure provides a method for animating a communicative utterance (e.g. speech) comprising: receiving~~:~~ a String to be animated, the String comprising a plurality of communicative utterance atoms; receiving a plurality of Collections, each Collection including a plurality of Items comprising unique atom strings, each Collection storing Items of different lengths, wherein at least one of the Items is based on an occurrence of acoustic silence before or after a particular communicative utterance atom; and each Item including at least one Animation Snippet of the Item; hierarchically searching the Collections for Items matching substrings of the String; retrieving Animation Snippets for matched Items to cover communicative utterance atoms; and combining the retrieved Animation Snippets to animate the String.

[0009] In an ~~second aspect~~example, the present disclosure provides a method for animating speech comprising: receiving: a String of phonemes to be animated; and a plurality of Animation Snippets comprising strings of polyphones and part-phonemes configured to be concatenated at or about the most stable part of a phoneme; searching for and retrieving Animation Snippets matching substrings of the String of phonemes to cover the String of phonemes; and combining the retrieved Animation Snippets to animate the String.

[0010] In an ~~third aspect~~example, the present disclosure provides a method for animating a phoneme in context comprising: receiving: a Model Viseme ; and an Animation Snippet corresponding to a time series of animation weights of the phoneme being pronounced in context; blending between the animation weights of the Model Viseme and the animation weights of the Animation Snippet to animate the phoneme in context.

[0011] In an ~~fourth aspect~~example, the present disclosure provides a method for expressive speech animation including: receiving: a first animation input associated with muscle-based descriptor information; and a second animation input associated with muscle-based descriptor information; using the first animation input and the second animation input as arguments in a Output Weighting Function configured to map the animation inputs to muscle-based descriptor weightings for animating the expressive speech animation, wherein the Output Weighting Function is configured to reconcile muscle-based descriptor information from the first and second animation inputs and; animating using the mapped muscle-based descriptor weightings.

.BRIEF DESCRIPTION OF DRAWINGS

Figure 1 shows a flow diagram of a process for generating speech animation;

Figure 2 shows a flow diagram of creating a lookup table;

Figure 3 shows a flow diagram of a method of animating speech;

Figure 4 shows text processing for construction of the lookup table;

Figure 5 shows an example of matching substrings from different Collections to a sentence;

CLAIMS

1. A method for animating a communicative utterance comprising: ~~receiving:~~

receiving a String to be animated, the String comprising a plurality of communicative utterance atoms;

receiving a plurality of Collections, each Collection including a plurality of Items comprising unique atom strings, each Collection storing Items of different lengths, wherein at least one of the Items is based on an occurrence of acoustic silence before or after a particular communicative utterance atom; and

each Item including at least one Animation Snippet of the Item;

hierarchically searching the Collections for Items matching substrings of the String;

retrieving Animation Snippets for matched Items to cover communicative utterance atoms; and

combining the retrieved Animation Snippets to animate the String.

2. The method of claim 1, wherein the communicative utterance is speech.

3. The method of claim 1 or claim 2, wherein the hierarchical order favours longer Items.

4. The method of any one of claims 1 to 3, wherein at least one Item includes a plurality of Animation Snippets, and an Animation Snippet is retrieved based on its duration.

5. The method of any one of claims 1 to 3, wherein at least one Item includes a plurality of Animation Snippets, and an Animation Snippet is retrieved based on corresponding speech features.

6. The method of any one of claims 1 to 5, wherein Animation Snippets are associated with sound corresponding to the animation.

7. The method of claim 6, further comprising ~~including~~ the step of compressing and/or stretching Animation Snippets to match the sound corresponding to the animation.

8. The method of any one of claims 1 to 7, wherein the Items include part-phoneme strings.

9. The method of any one of claims 1 to 8, wherein the Items include part-phoneme strings,

wherein one or more of the Items are included in a first Collection of Items from a plurality of different Collections of Items;

wherein the first Collection of Items comprises a Sentence Boundary Collection that includes a first type of dipho string and a second type of dipho string;

wherein the first type of dipho string represents an occurrence of acoustic silence pre-defined as being paired with a subsequent respective syllable type; and

wherein the second type of dipho string represents an occurrence of acoustic silence pre-

defined as being paired with a preceding respective syllable type.

~~9.~~10. The method of any one of claims 1 to 9, wherein Animation Snippets store Muscle-Based Descriptor weights.

11. The method of claim 10, further comprising an Output Weighing Function configured to map the Muscle-Based Descriptor weights for animating the string.

12. The method of claim 11, wherein Animation Snippets store Priority Weightings, wherein the Output Weighing Function is a function of the Priority Weightings.

~~10. A method for animating speech comprising:~~

~~receiving:~~

~~a String of phonemes to be animated; and~~

~~a plurality of Animation Snippets comprising strings of polyphones and part-phonemes configured to be concatenated at or about the most stable part of a phoneme;~~

~~searching for and retrieving Animation Snippets matching substrings of the String of phonemes to cover the String of phonemes;~~

~~and combining the retrieved Animation Snippets to animate the String.~~

~~11. The method of claim 10 wherein part-phonemes are half-phonemes.~~

~~12. A method for animating a phoneme in context comprising:~~

~~receiving:~~

~~a Model Viseme; and~~

~~an Animation Snippet corresponding to a time series of animation weights of the phoneme being pronounced in context;~~

~~blending between the animation weights of the Model Viseme and the animation weights of the Animation Snippet to animate the phoneme in context.~~

~~13. The method of claim 12 wherein the Model Viseme is a Lip-Readable Viseme depicting the phoneme in a lip-readable manner.~~

~~14. The method of claim 12 wherein the Model Viseme is represented as an animation sequence.~~

~~15. The method of claim 12 wherein the degree of blending of the Model Viseme over time is modelled by a function, with the peak of the function being at or about the peak of the phoneme pronunciation.~~

~~16. A method for expressive speech animation including: receiving:~~

~~a first animation input associated with muscle-based descriptor information; and~~

~~a second animation input associated with muscle-based descriptor information;~~

~~using the first animation input and the second animation input as arguments in a Output Weighing Function configured to map the animation inputs to muscle-based descriptor weightings for animating the expressive speech animation,~~

~~wherein the Output Weighing Function is configured to reconcile muscle-based descriptor information from the first and second animation inputs and;~~

~~animating using the mapped muscle-based descriptor weightings.~~

~~17. The method of claim 16 including the step of defining at least one Muscle-Based Descriptor Class Weighting for each muscle-based descriptor, wherein the Output Weighing Function is a function of the Muscle-Based Descriptor Class Weightings.~~

~~18. The method of claim 16 including the step of receiving a Priority Weighting for each animation input, wherein the Output Weighing Function is a function of the Priority Weighting.~~

~~19. The method of claim 16 wherein the first animation input is for animating Speech.~~

~~20. The method of claim 16 wherein the second animation input is for animating Expression.~~