EasyChair Preprint
№ 8649

3D Face Rig Expressions Database Generation for AI Expression Selection

Prajwal Kumar and C K Poornima

August 11, 2022

3D Face Rig expressions Database generation for AI expression selection

Prajwal kumar P[1] ,Poornima CK

[1] Assistant Professor,Government First Grade College Kadur ,chikmagalur, Karnataka india

prajwalkumarprof@gmail.com ,poornima.c.k.28@gmail.com

Abstract

In 3D animation software and environment models represented by mesh and core animation for characters are handled by Bone Rig. In this process audio can be used as input to generate motion of face rig bones to produce expression in the modelled character. There are many researchers previously in this ideology , with Little contextual difference that is expression categorisation is ignored . We intend to proceed and develop an algorithm to extract 9 action expressions called Rasa   (karuna ,hasya, sringara,rudra ,veera,bhayankara,bibatsa,adbuta,shanta)in kannada language and ancient script related acting skill .in this paper will collectively represent rasa's in rigged motion to depict appropriate expression Human 3D Face model.

Keywords: 3D model, Character, animation,Rig,Rasa,pose.

1.Introduction

In a 3D work environment, Animation of Human face depends on multiple factors such as available work environment tools,spoken language and finally the act of a particular scene and emotion of human models. All these factors can change the animation's effectiveness. In many 3D modelling software tools this Face animation / Face expression / emotional / are directly brought from motion capture equipment. This motion capture equipment also requires a Actor real time action to capture animation for Face rig .Motion capture method involves lots of sensors and physical equipment and actor which makes creating 3D animation much more expensive than really shooting for performance.

In this paper we are Presenting a method of generating animation for Face Rig in a 3D environment (blender 3D open source software) based on Language and Acting   . Language is the only way on screen a human 3D model / Actor sound in scenes or movies. Every language has its sound phonetics which makes them unique . the 3D animation Development industry left a small gap in the process of creating human face animation based on language . This paper details with the small left of Area in 3D animation environment which can impact efficient and accuracy of human faced 3D model animation process.

In this paper we develop rig pose for human Face animation. This collection of poses will directly represent Kannada Language phonetic sound. Kannada language is stated as the oldest language that exists today . Most importantly and kannada language is " the most phonetic" language in the world

Database collection of pose will be based on. Swaras(13)yagavahaka(2), venjana(34) because their phonetics are so effective this terms can be used directly as a factor of change.

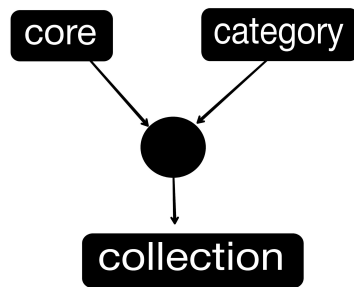$(13+2)*34 = 510$ different posed

Fig .1

This posed can also vary based on acting Emotional factor there are 9 action expressions called Rasa (karuna ,hasya, sringara,rudra,veera,bhayankara,bibatsa,adbuta,shanta)which differentiate expression in human face those factor will bring down the effectiveness of animations .

9* 510 = 4590 different poses could be a rich set of rigged animation for creating human face 3D animation speaking kannada language with every accurate precession.

2. Previous work concepts

3D animation softwares are built by many professional companies. They retain their intellectual property as private which doesn't let researchers to be involved in development.
where as blender 3d is build by open source community
Blender 3D is most popular among 3D development individual and small scale animation companies.

In Maya, one of leading software in the 3D animation industry, expressions can be made with a rigged face, or by using the Shape Editor and sculpting tools. This multiple model in parallel is used to develop express for face .The advantage of using the Shape Editor is that   individual expressions swap between them freely, or even combine them with varying strengths for each one.

Motion capture using sensors is done by tools such as Xsen, rokoko . These tools own a lot of patents on motion capture methods .

3.Methodology

Listing of bones in Face rig under grouping such as main face features ,a)lips up and down(2),b) eyes left and right(2) c)eye brows(2) every important for expressing emotion, and d)chiks left and right(2) and e) forehead (1) and f) chin (1)
 a+b+c+d+e+f
2+2+2+2+1+1= 8
This group of bones will be the core of expression for human face animations. Based on phonetic sound. this bone position will need to changed with interpretation of accurate expression

Dataset collection poses will be generated by AI algorithm on input will be a 15 core , 510 phonetic set final set consistent with 4590 expression set . To generate 4590 expressions, 510 phonetic expressions need to incorporate 9 acting effects . This acting effect can be given as choices of vertical progress selection. Which will optimise the gui interaction and understanding.for simplify access and load 9 different .blend files are created for storage one each type . Inside blender storage of each pose can be titled and added to asset library/ pose library.

As mentioned, swara and yagavahaka are classified as core expression 15.

Next 34 different endpoint expressions are for 34 venjanas . The generation of 15*34 = 510 End point expression will be done by Algorithm which will make use of 'knowledge of face expression dataset'.

AI Expression Generation Algorithm:
Input : 15 and 34, Face Rig poses ,1 Acting Category Selection
Dataset: human face expression collection
Output: 510 - Face Rig poses . Representative End Expression. Sample depiction are shown in the Fig.1 below.

Fig . 2.core-sound representation

Dataset: collection of images with bone marks . Different expressions.

Bone rig sample pose: after generation
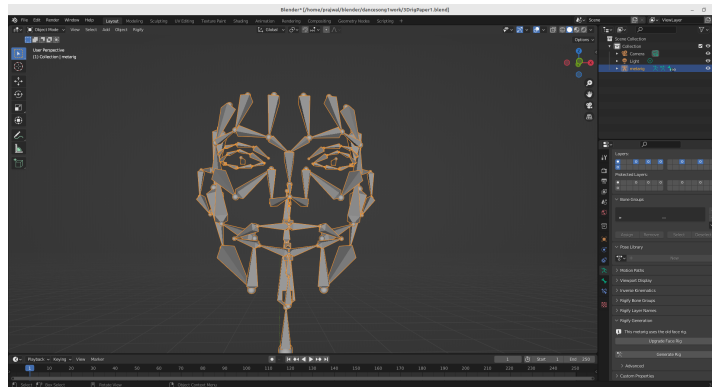

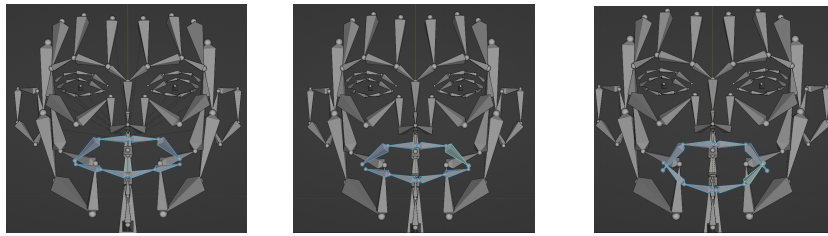Fig . 3-Expresion-category representation

Fig.3

4.Results

Fig .4

Here is sample bone rig represents mount poses .which as very high movement relationship with everyone letter and word while speaking**.**
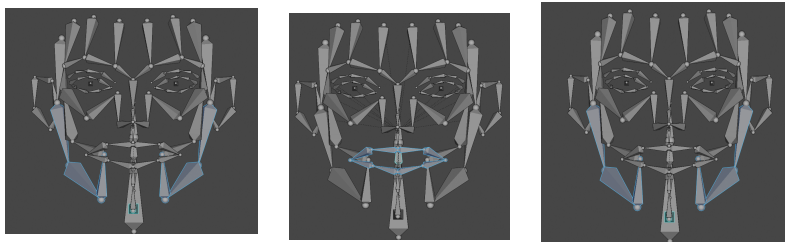

Fig .5
Sample bone rig representation of jaw lines movement . Which will have very little changes.
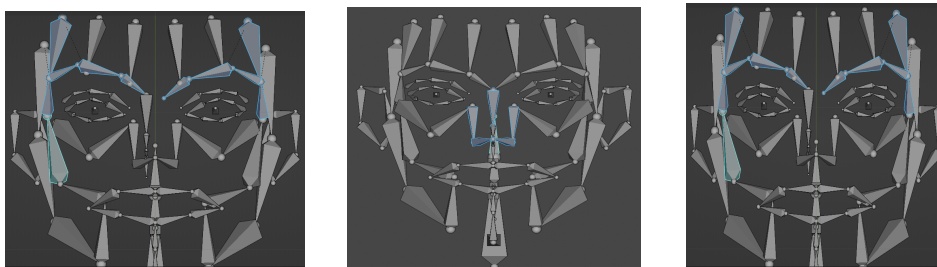

Fig.6

Sample bone rig representing forehead and eyebrows, nose variation to simulate expression .
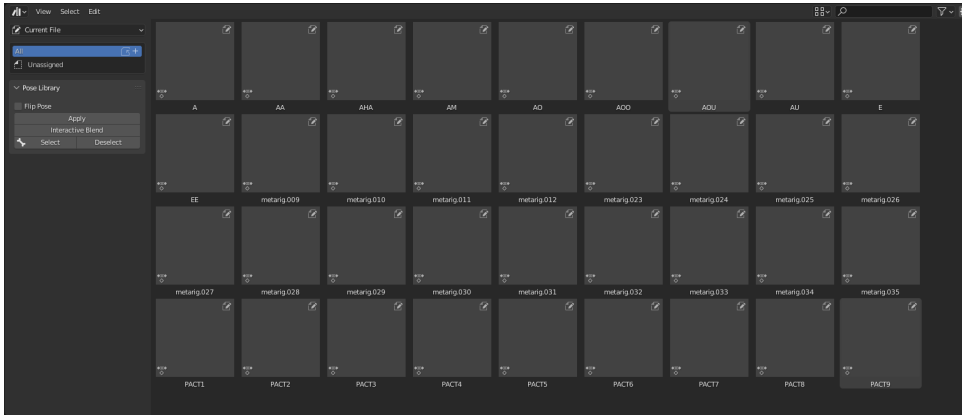
Fig.7. is an asset browser window in the blender software which contains the collection of poses created with reference to kannada language letters.

5.Conclusion

This paper demonstrates the building of a unique dataset face rig- poses for a particular language (kannada in this case) . This dataset will enhance the accuracy of 3Dhuman character animation in priscriped language. Most 3D animation tools are licensed by corporates whereas blender 3D is open source which has very little support for face rigged animation or motion capture tools in human face animations this paper presents a small data set collection which presents mechanisms for building poses for face rig and increase the speed of work in human model animation .

References

1.Matahari Bhakti Nendya -Facial Rigging for 3D Character :IJ & Animation 4(3):21-29
   https://www.researchgate.net/publication/274144439_Facial_Rigging_for_3D_Character

2.Tihomir Dovramadjiev **-** Rigging & Animation of 3D Human Model
https://www.researchgate.net/publication/330858265_Blender_software_Rigging_Animation_of_3D_Human_Model

3. Desmond Eustin van Wyk -Virtual Human Modelling and Animation
   https://core.ac.uk/download/pdf/58914255.pdf

4 Acoustic Phonetic Characteristics of Kannada Language - CiteSeerX
   http://citeseerx.ist.psu.edu/viewdoc/download3Fdoi3D10.1.1.403.119426rep3Drep126type3D.pdf

5.Dalai Felinto, Hans Goudey Blender Foundation- Animation Toolset
   https://www.blender.org/features/animation/