Summary and Conclusion

5.1 Research Contribution
The development of a system which can produce a three-dimensional facial reconstruction of an individual can be of used by various law enforcement agencies, by allowing faster, easier and more efficient generation of 3D model of an individual. The resulting facial model will have facial features with close association of anthropometric dimensions of the target. Facial approximation technique is used for modeling of facial features such as the eyes, nose and lips, which are difficult to reconstruct accurately solely from cranial information. System is a result of study of face from various aspects, namely Artistic and scientific

Artist’s devotion to the study of human face is taken as serious input. Research is extract of facial study by various virtuosos, scientists from many centuries and showcases their dedicated efforts with the help of latest technology. The norms set by these virtuosos are converted to interdependent flexible mathematical expressions to derive facial features. Thus presented facial reconstruction system also makes room for future investigation.

Study from various branches is unified into one process. Orthodontists and Plastic surgeons can use this 3D model in crucial decision making to visualize patient’s face.

5.2 Research Outcome
The process satisfactorily addresses the major challenge of handling the wide range of input formats coming from totally different system.

For Anthropologists, relevant dimension information will be shown on 3D facial surface; this will be the one of the fastest and dimensionally correct facial simulation
process. The system exported 3D data will match anthropometric measurements taken in the clinic.

There is a great need of scientific visualization of head in 3D space for forensic doctors, orthodontists and plastic surgeons. This presented facial reconstruction system will serve their purpose by indicating relevant information and will help in exploring variations and other critical decisions.

5.3 Conclusion
Researcher has proposed a new multi-phased process based on anatomy for producing facial model in reasonable time. This study discovers unified path of understanding the human face from various streams ranging from art to science and builds a common channel for information exchange.

Study was comprised of various experiments involving various methods of facial construction, simulation and presents best practical method for facial reconstruction in 3D environment.

5.4 Summary
Face modeling plays a crucial role in many branches. A novel facial reconstruction process has been presented which combines traditional knowledgebase of human face. The proposed methodology ideates new concepts like Vyaktirekha and Jeevak (Section 3.6.8) to adumbrate human face in 3D environment. Researcher embarked the process with conceptually standard face. Further by adding details in phases, manifestation of the absolute personality can be visualized in 3D environment.

5.5 Future Work
The system can become a huge source of information by increasing the scope of the study. Following features can be added to enhance the output.
i. Skin texture, can be extracted from the photographs. The skin shader can be developed with diffuse, specular, normal map to give exact look of an individual.

ii. Hairstyle and Haircut can also be added as separate module and will enhance the results.

iii. ShilpaMudra and BhavMudra phases can be studied and implemented to enhance the outcome of the system. Wrinkles, scars and other skin details can be added in normal map of skin shader. Libraries of various accessories, head wears can be developed separately and associated with the facial model to generate variations of an individual.

iv. Although current study limits facial variation of Caucasian male of Indian origin, in future it can be extended to females, wider age group and for other races and sub races. Detailed morphometric analysis of each feature and its conversion into various blend shapes will enhance the quality of the system.

v. Each branch evolves new knowledgebase that can be converted as new input for the proposed system. The concept of Vyaktirekha and Jeevak (Section 3.6.8) are flexible to adopt these changes.

vi. Human adoption to dental rearrangement over given time can be explored in further. After feeding this vital information as mathematical relation between appropriate key points, it may empower various medical practitioners with vital information. Orthodontic, surgical operations may be simulated on 3D face to predict implications.