

Facial-Align: Integrating AI for Reconstruction of the CranioMaxillofacial Skeleton

The craniofacial skeleton is a complex unit involving relationships between bony and soft tissue structures such as nerves, blood vessels, muscles, eyes, and the brain.

To complicate matters, reconstruction of the craniofacial skeleton involves appropriate maintenance and balance of the **pre-existing dentition**.

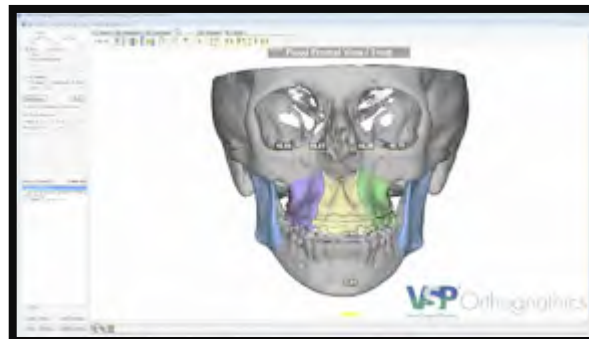
The **Gold Standard** of treatment is hand manipulation of these fractured segments, in often 1 or 2 planes of space.

Problem: Human Error, lack of visualization, and unknown pre-morbid anatomy. This leads to a >30% error in results



Pre-operative CAD/CAM Planning Workflow:

CT SCAN → DICOMS → STL → Segmentation → Manipulation on commercial software



Problem: Planned movements of the facial skeleton are based on “human bias and experience.”

Objective

Create a machine learning algorithm to reconstruct the craniofacial skeleton utilizing known skeletal **AND** dental relationships



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Facial-Align:

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- **What You Will Do:**
 - Creation of an algorithm that will reconstruct the facial/dental skeleton to its predicted pre-morbid condition.
- **Deliverables:**
 - Development of a machine learning algorithm of our known craniofacial landmarks of “non-pathological” subjects.
 - Development of a machine learning algorithm to align the upper and lower teeth into proper occlusion (alignment).
- **Size group:** 1-2
- **Skills:** segmentation, statistical shape modeling, CAD/CAM
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