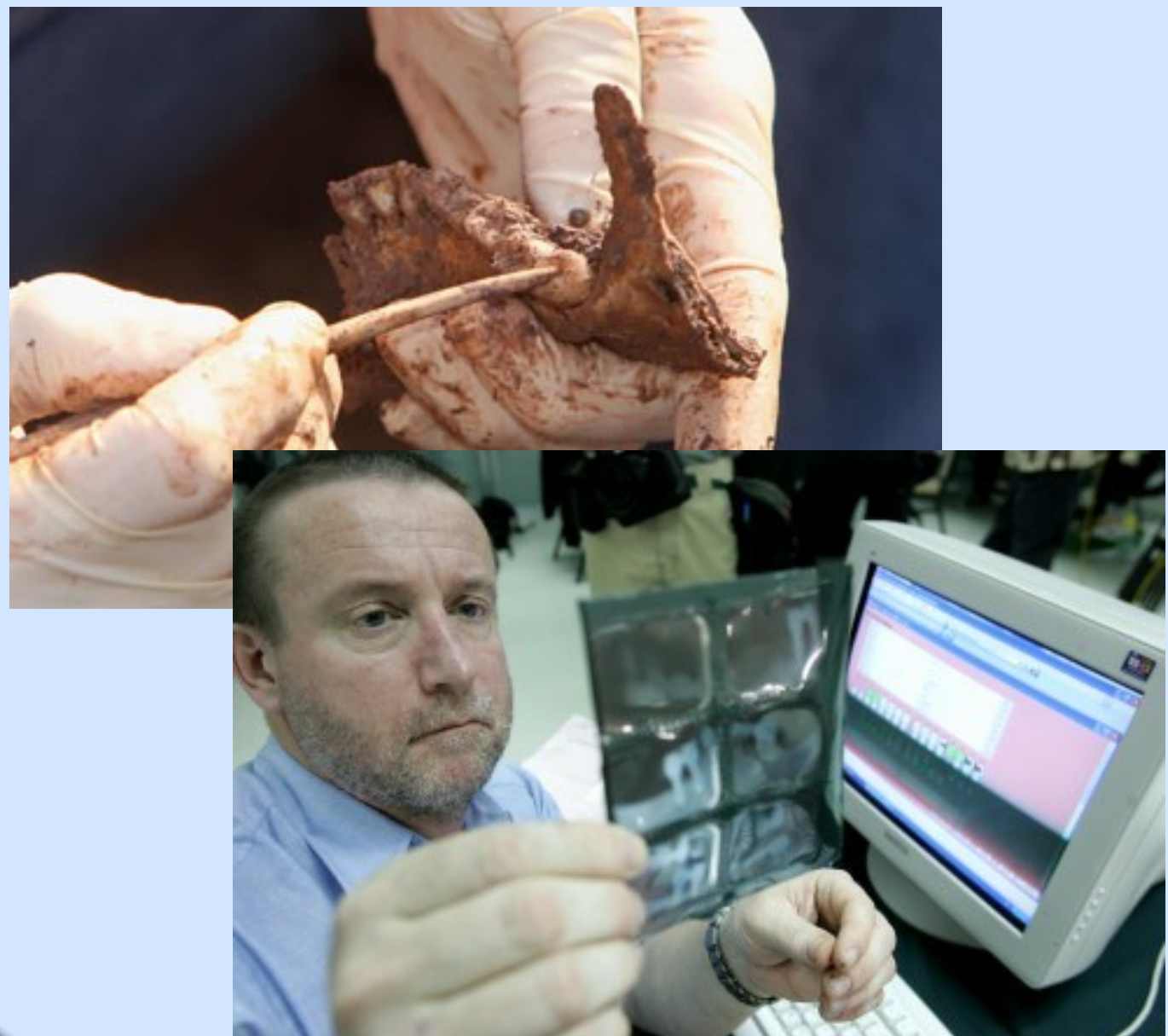


# 3D Dental Biometrics: Automatic Pose-invariant Dental Arch Extraction and Matching (ICPR 2021 1788)

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**Keywords:** Dental Arch Extraction, Forensic Dentistry, Human Identification

## Forensic Dentists



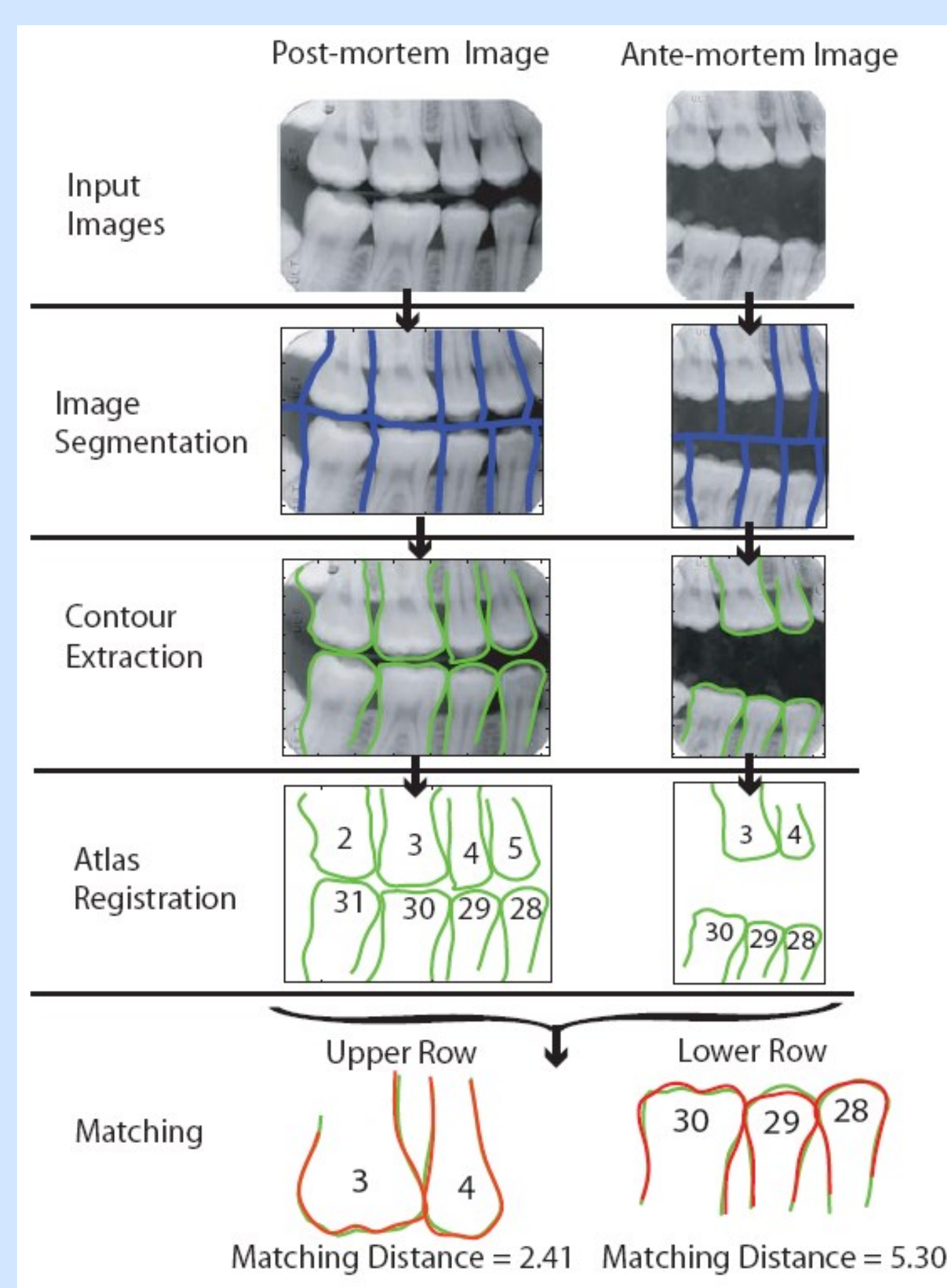
➤ When the police discover a dead body with no identification documents...

➤ Case 9/11-20% of 937 victims were identified using dental records in the first year.

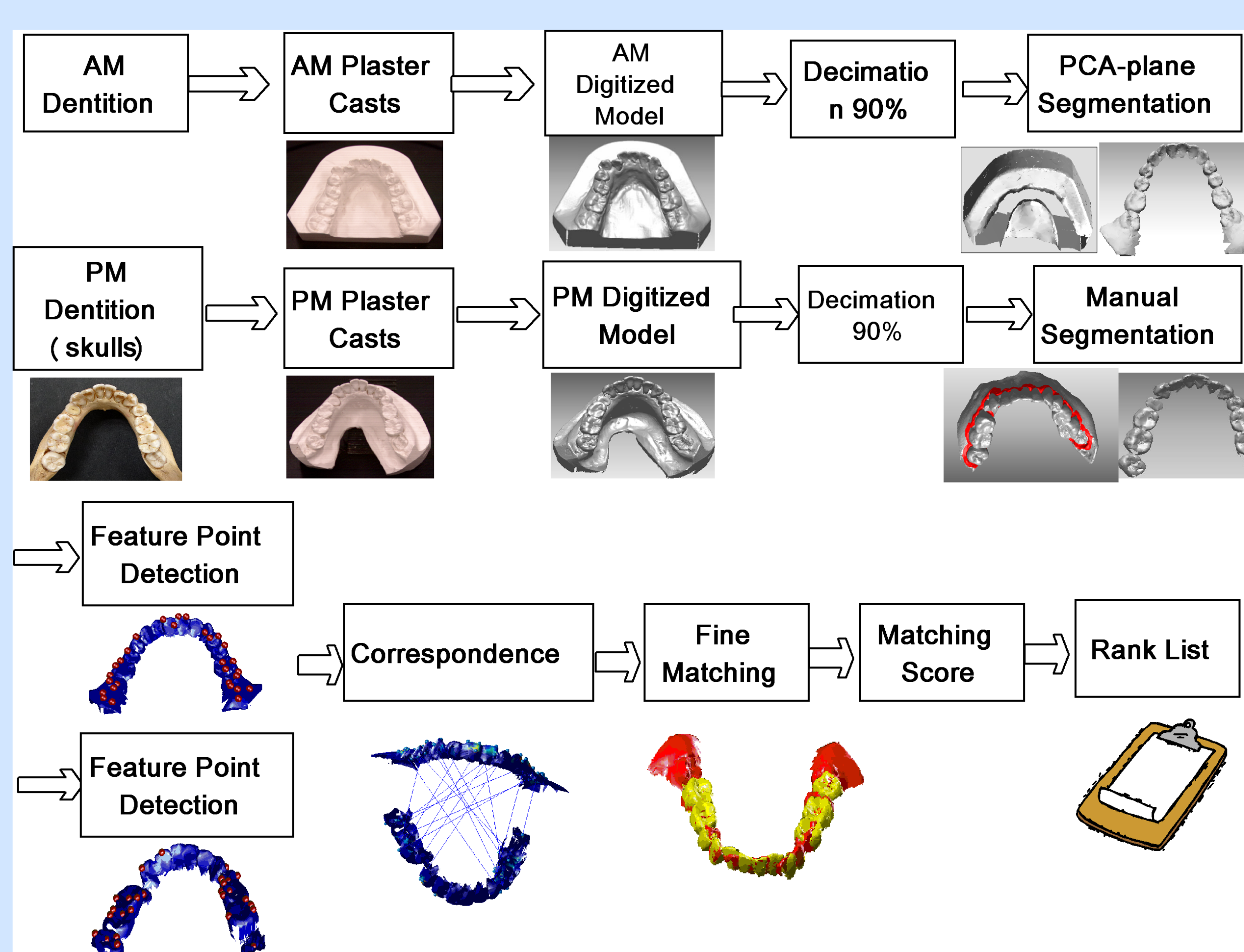
➤ Case Asian Tsunami -75% of 190,000 victims were identified by dental records ... 0.5% identified using DNA

## 1. True Stories

## 2. 2D Vs 3D Automated Dental Biometrics



Literature Work



Our Work

### 2D dental biometrics

- 2D projections of 3D objects
- poor image quality
- time-consuming tooth contour extraction

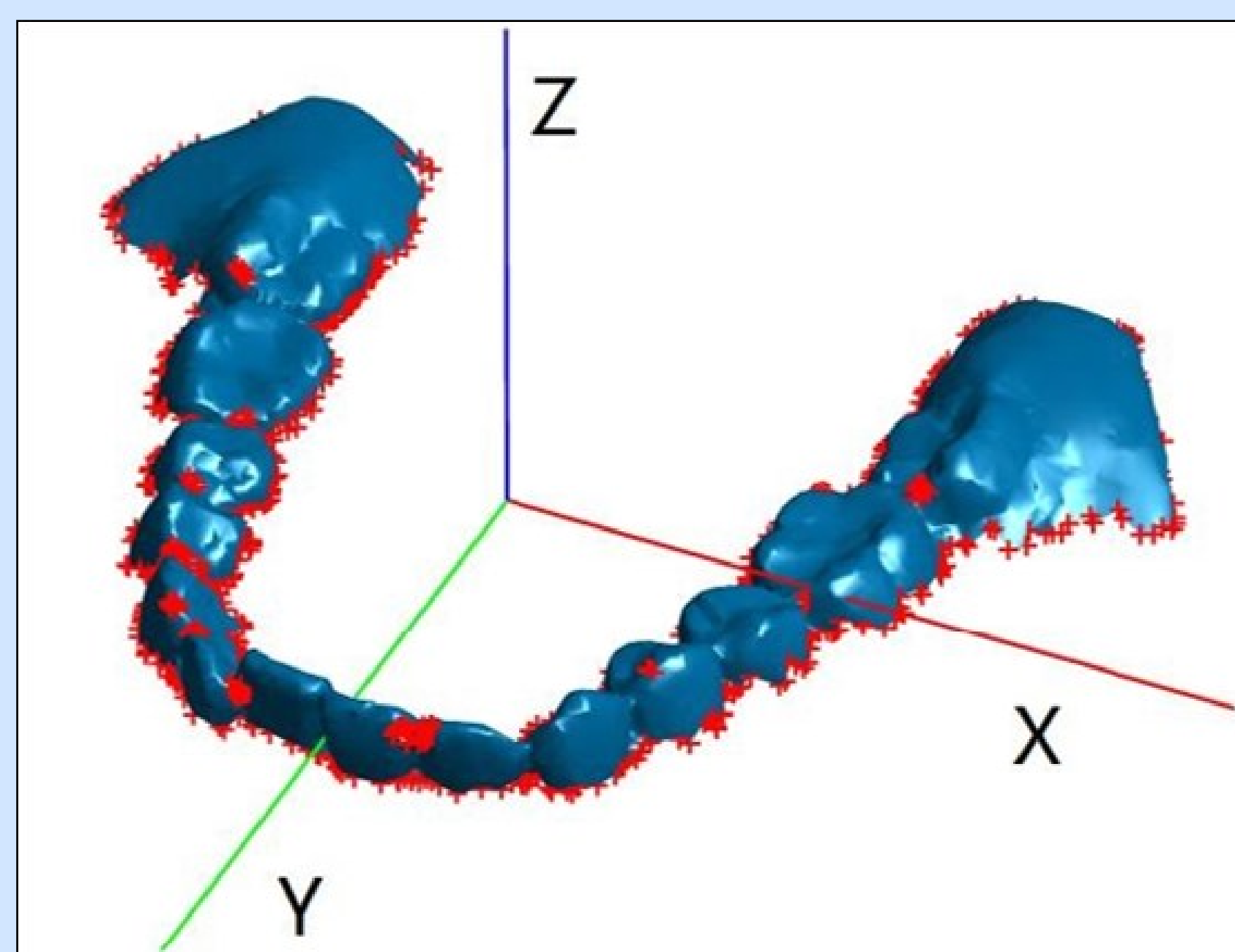
**Vs**

### 3D dental biometrics

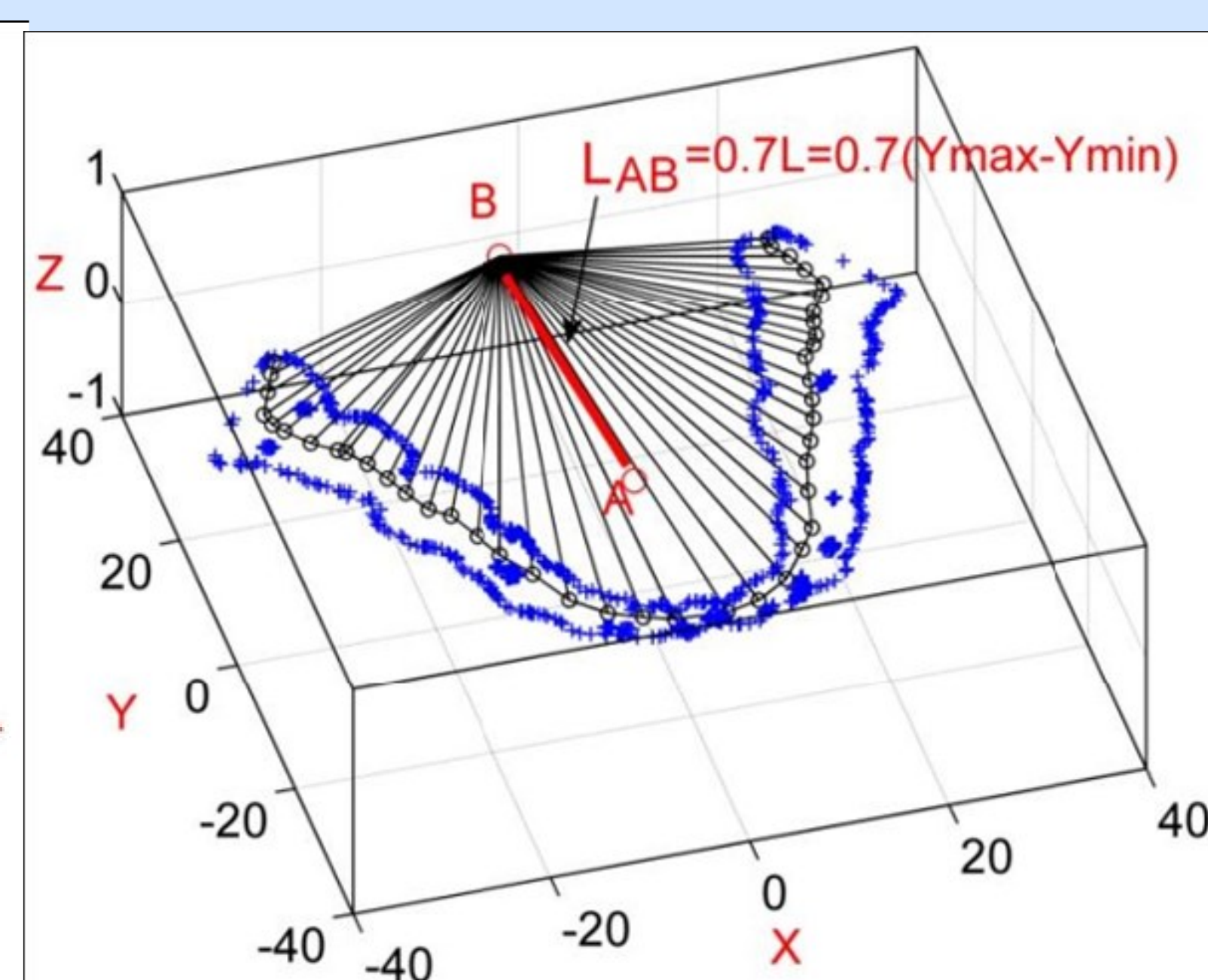
- accurate tooth shape description
- more dental 3D anatomic features such as the dental arch

## 3. Dental Arch Extraction and Matching

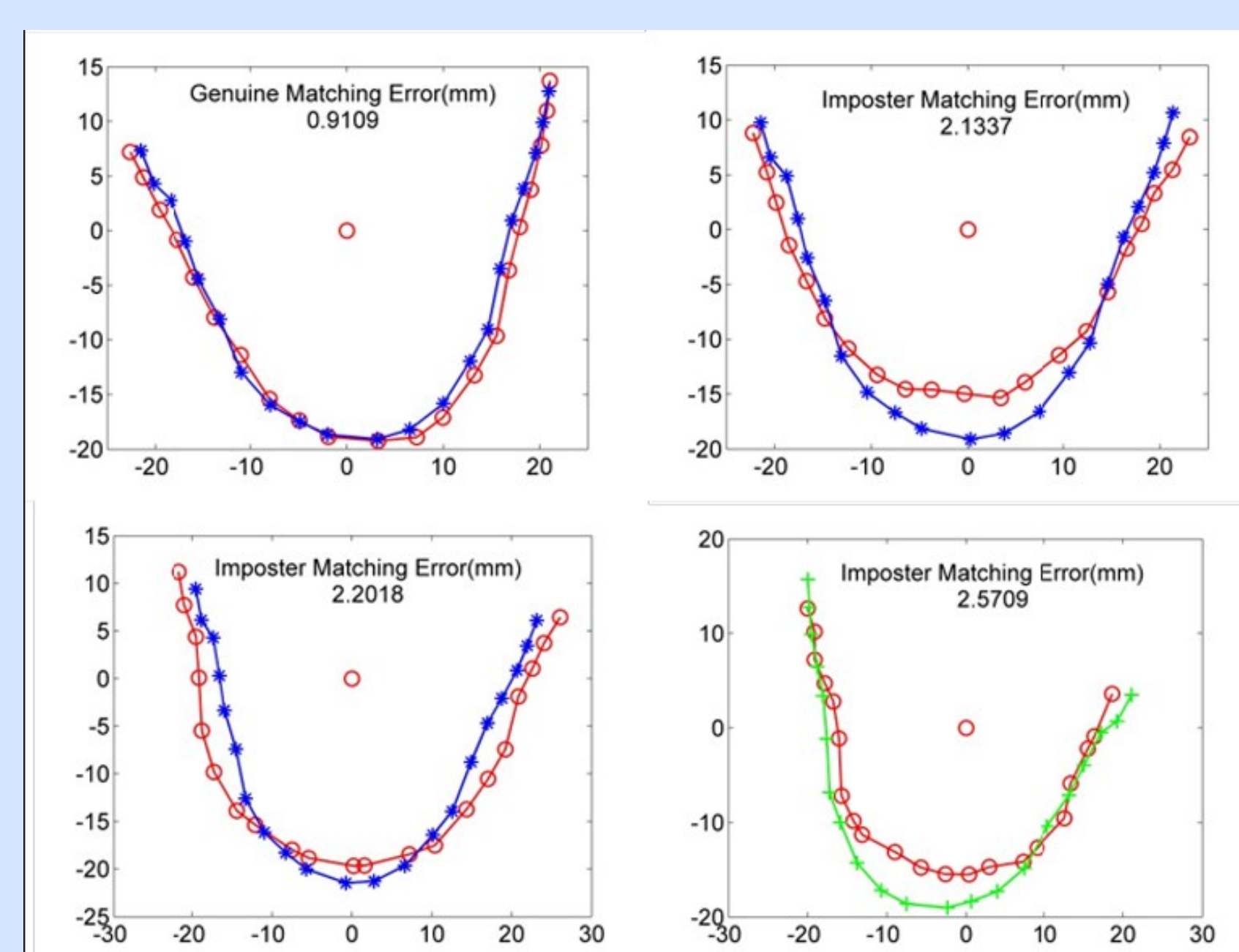
Input: 11 post-mortem(PM) ; 200 ante-mortem(AM)    Output: rank list



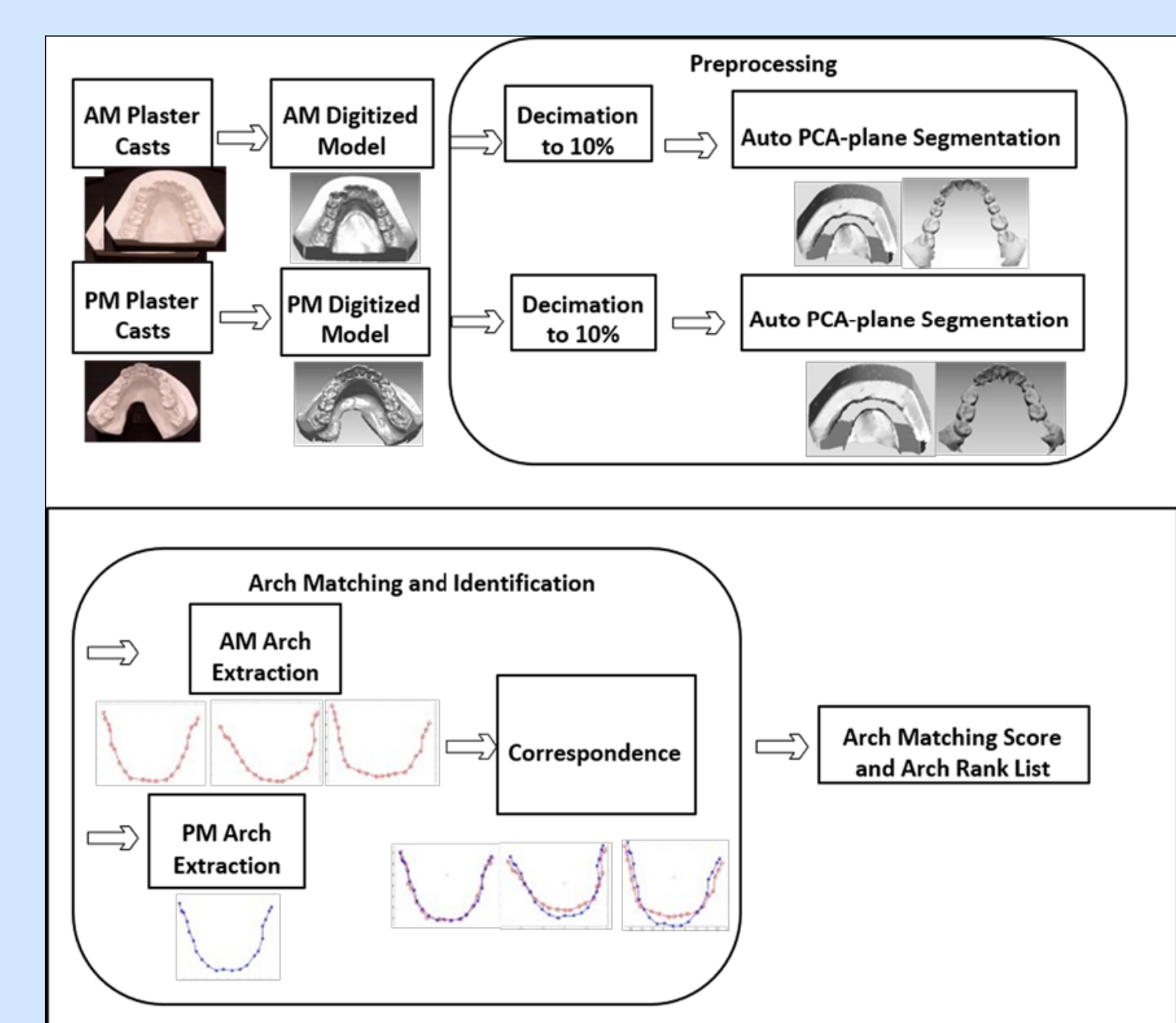
Aligned 3D Surface Model  
With Boundary Points



Radial Ray Algorithm(RRA)



Genuine & Imposter Matchings



3D Dental Arch  
Identification Framework

## Contact

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## 4. Contributions

- First Attempt at 3D dental biometrics: unique dental arch feature extraction from 3D surface models
- Faster and robust pose-invariant matching and identification