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(54) **3D FACE AUTHENTICATION AND RECOGNITION BASED ON BILATERAL SYMMETRY ANALYSIS**

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Related U.S. Application Data

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(51) **Int. Cl.**
G06K 9/00 (2006.01)

(52) **U.S. Cl.** **382/118**; 382/154

(58) **Field of Classification Search** 382/118, 382/154

See application file for complete search history.

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(57) **ABSTRACT**

There is provided a novel approach for automatic human face authentication. Taking a 3D triangular facial mesh as input, the approach first automatically extracts the bilateral symmetry plane of the face surface. The intersection between the symmetry plane and the facial surface, namely the Symmetry Profile, is then computed. By using both the mean curvature plot of the facial surface and the curvature plot of the symmetry profile curve, three essential points of the nose on the symmetry profile are automatically extracted. The three essential points uniquely determine a Face Intrinsic Coordinate System (FICS). Different faces are aligned based on the FICS. The Symmetry Profile, together with two transversal profiles, namely the Forehead Profile and the Cheek Profile compose a compact representation, called the SFC representation, of a 3D face surface. The face authentication and recognition steps are finally performed by comparing the SFC representation of the faces.

1 Claim, 11 Drawing Sheets
(7 of 11 Drawing Sheet(s) Filed in Color)
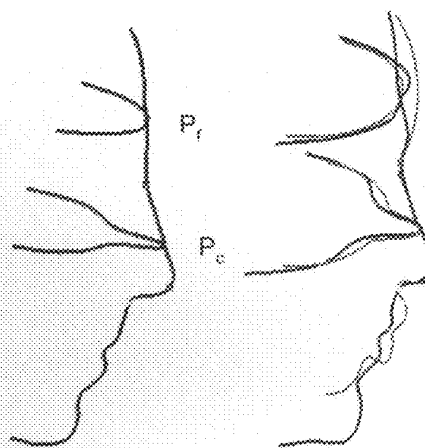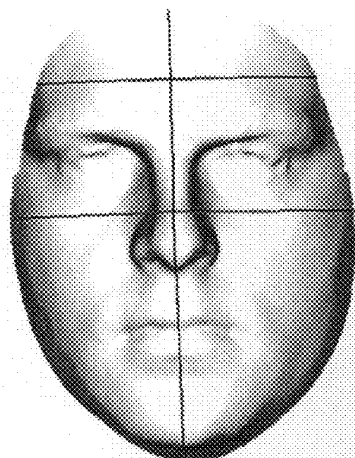
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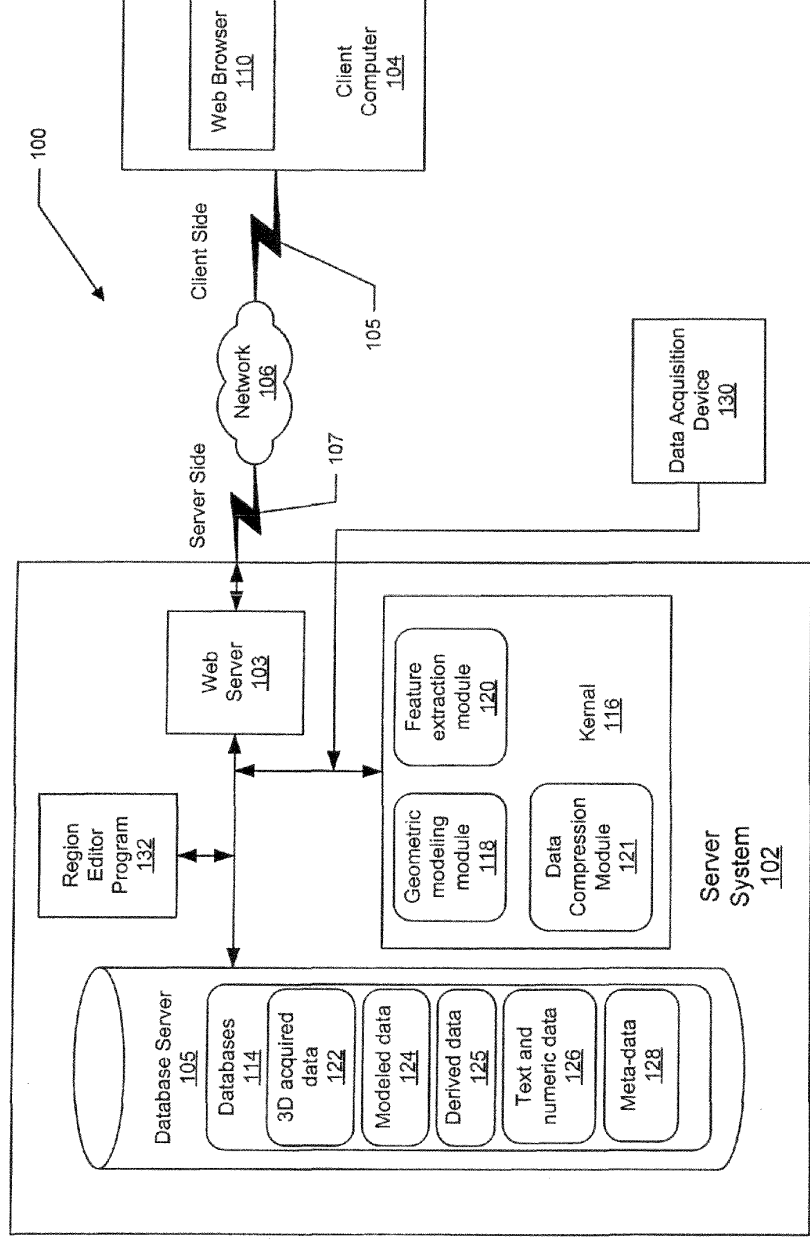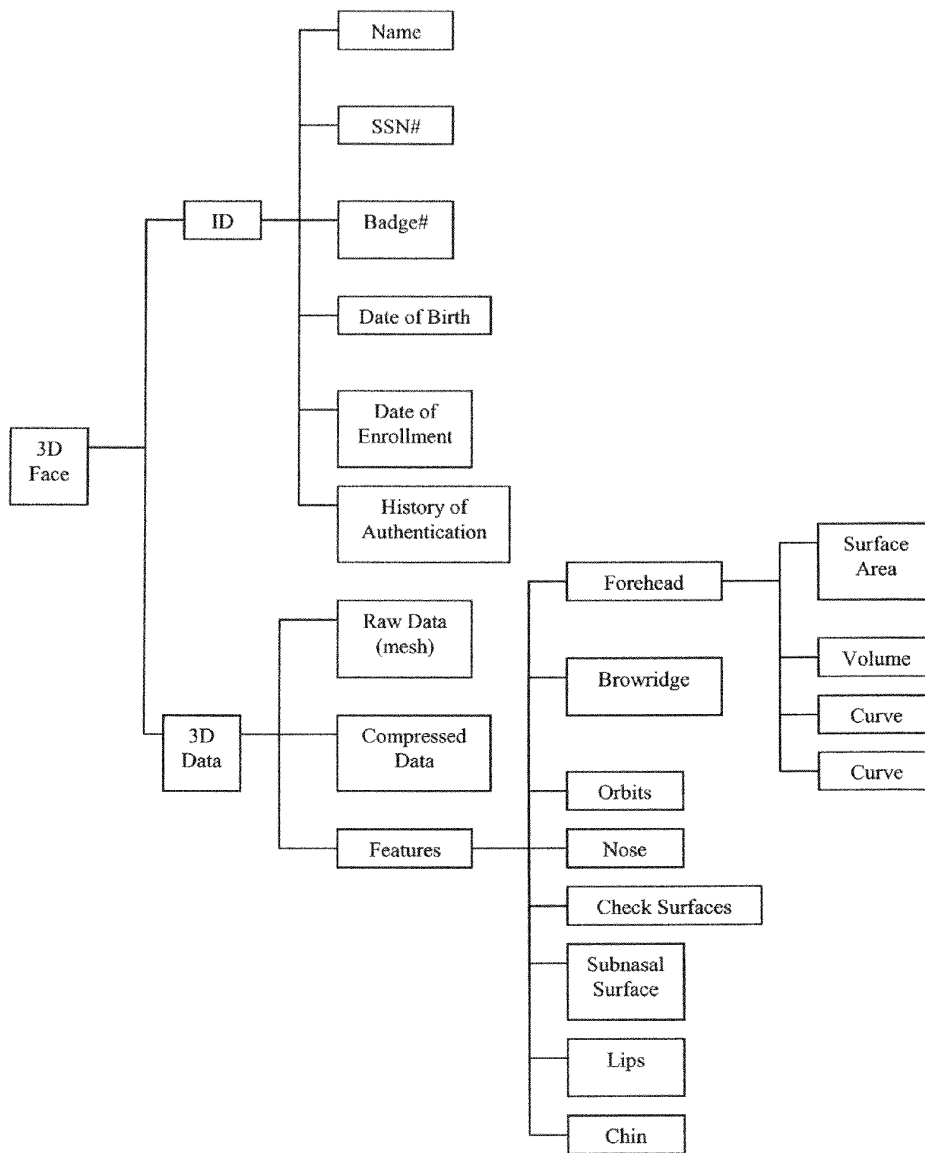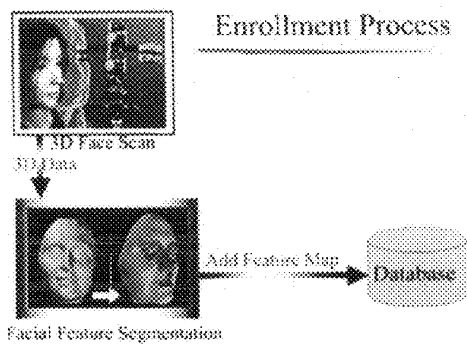FIG. 1

FIG. 2

FIG. 3A FIG. 3B

Enrollment Process

3D Face Scan

Facial Feature Segmentation

Add Feature Map → Database

FIG. 4

Authentication Process

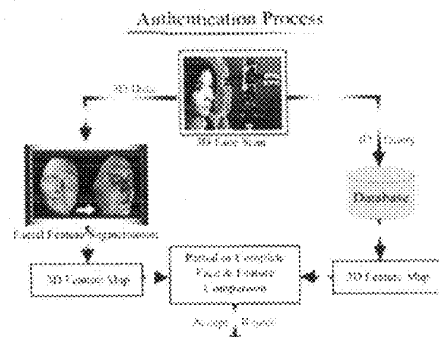3D Face Scan

Facial Feature Segmentation

FIG. 5

DOCKET ALARM

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