Human Face Detection and Recognition using Principal Component Analysis

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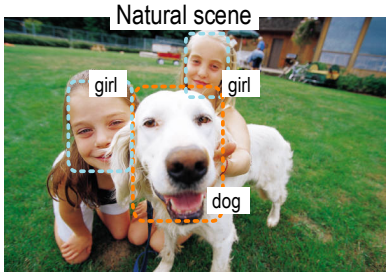
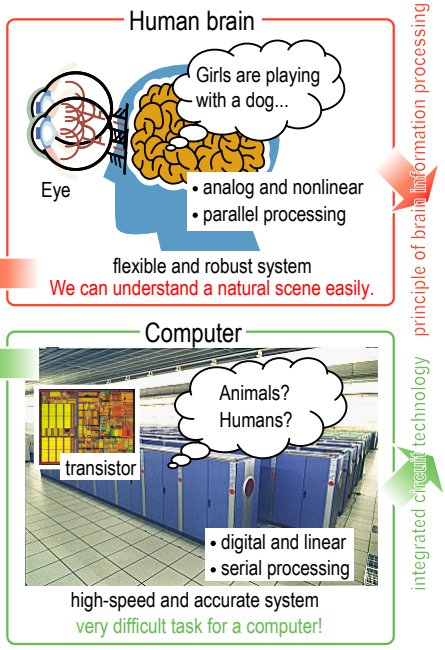
A concept of multi-object recognition system in order to develop a real-time natural scene recognition hardware



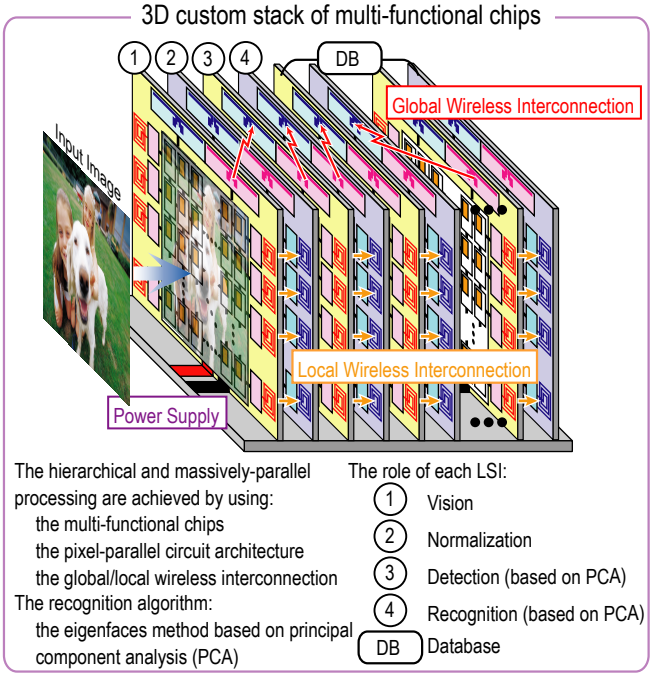
A natural scene usually includes several objects. There are several variations in size, orientation, lightning condition and so on. In order to understand various kinds of object from a natural scene, robust image processing techniques are required.

understand a natural scene by using...



principle of brain information processing

integrated circuit technology



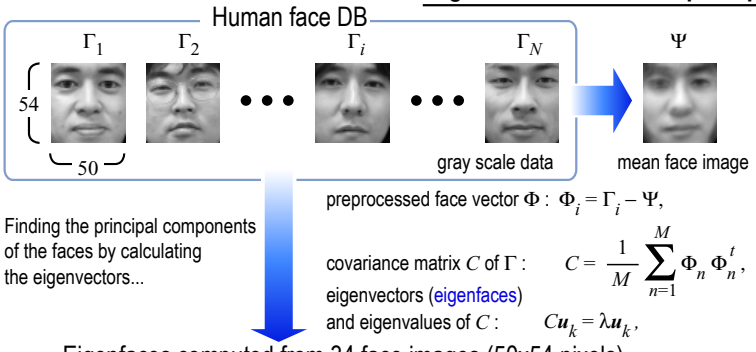
The hierarchical and massively-parallel processing are achieved by using:
- the multi-functional chips
- the pixel-parallel circuit architecture
- the global/local wireless interconnection

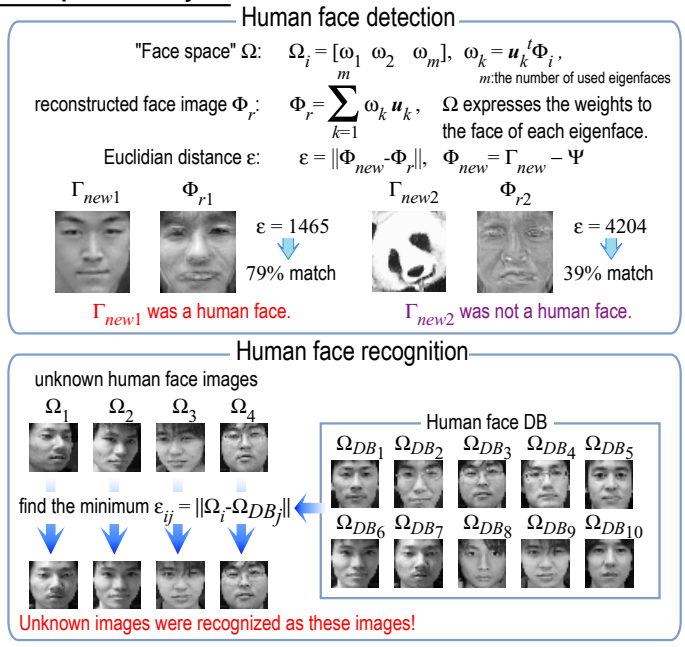
The recognition algorithm:
- the eigenfaces method based on principal component analysis (PCA)

The role of each LSI:
1. Vision
2. Normalization
3. Detection (based on PCA)
4. Recognition (based on PCA)

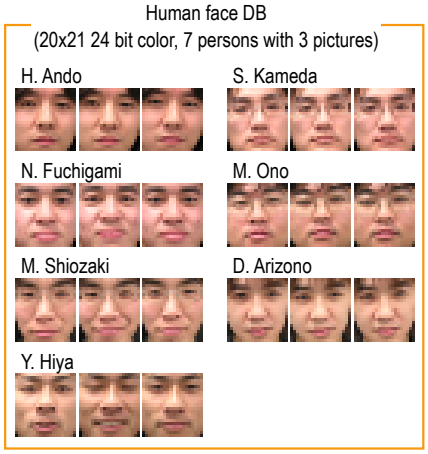
DB Database

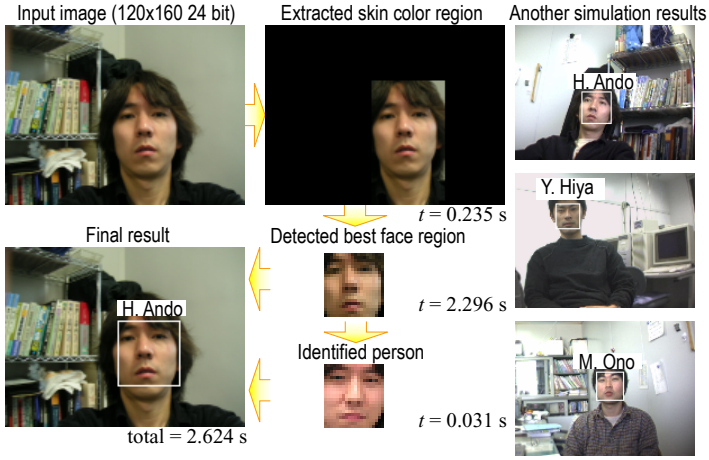
Eigenfaces method with principal component analysis





Numerical simulation results of human face detection and recognition





We can identify a person included in the pictures of a natural scene under some variations!

Conclusion

We proposed a concept of the multi-object recognition system composed of 3D custom stack. We also confirmed human face detection and recognition from a natural scene under some variations using the eigenfaces method.

We are scheduled to extend the eigenfaces method to recognize the multi-object and develop the emulator of the multi-object recognition system by using the FPGAs.