

Iris Matching Using SURF Algorithm

Rana Saad Mohammed¹, Nada Jasim Habeeb² and Ziad Mohammed Abood³

¹*Computer Science Department, Education Collage, Al-Mustansiriyah University, Baghdad, Iraq*

²*Technical College of Management Collage, Middle Technical University, Baghdad, Iraq*

³*Physics Department, Education Collage, Al-Mustansiriyah University, Baghdad, Iraq*

¹*Ranasaad2014@gmail.com, ²nadaj2013@gmail.com,*

³*dr.ziadmabood@gmail.com*

Abstract

Iris recognition is one of biometric techniques that provide fast and accurate for human identification. This paper studies four main types of iris (Jewel, flower, stream, and shaker). And also it studies a fast method using Speed Up Robust Features algorithm (SURF) for finding a match between original eye image and input eye image to the system with taking into account the speed of algorithm implementation and its compatibility with an iris scanner.

Keywords: *Iris types, image, Biometrics, correlation, extract of features*

1. Introduction

Biometric is a measurement that used to describe each individual characteristic from the other. The term “Biometric” is derived from Greek words “bio” meaning life and “metric” meaning to a measure [1]. There are two of traditional biometric systems: Token based identification systems (*e.g.*, passport or driver’s license) and knowledge based identification systems (*e.g.*, password or personal identification number) [2].

In recent, biometric techniques depend on unique individual characteristics. There are two main types of biometric identifiers. A first type is physiological characteristic that relate to the shape or composition of the body for example fingerprint, DNA, face, hand, iris, retina or ear features. A second type is behavioral characteristic that relate to the behavior of a person for example typing rhythm, gait, gestures and voice [3]. Figure (1), describes these two types.

This paper focuses on four main types of iris: Jewel, flower, stream, and shaker. The trait of iris jewel type is brown freckle-like dots or flecks. The trait of iris flower type is curved or rounded openings, like flower petals. The trait of iris stream type is straight lines or streaks of color. The trait of iris shaker type is both dot-like/freckle-like pigments and rounded openings. Figure (2), shows these four main types of iris.

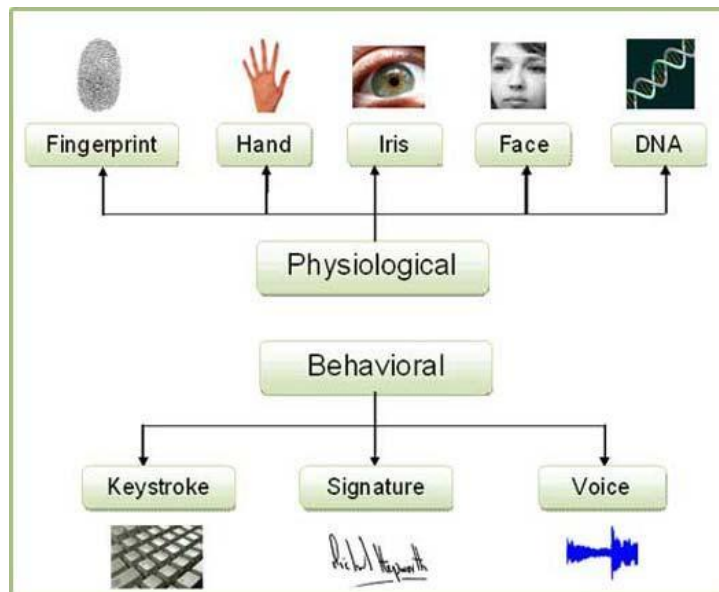


Figure 1. Two Main Types of Biometric Identifiers

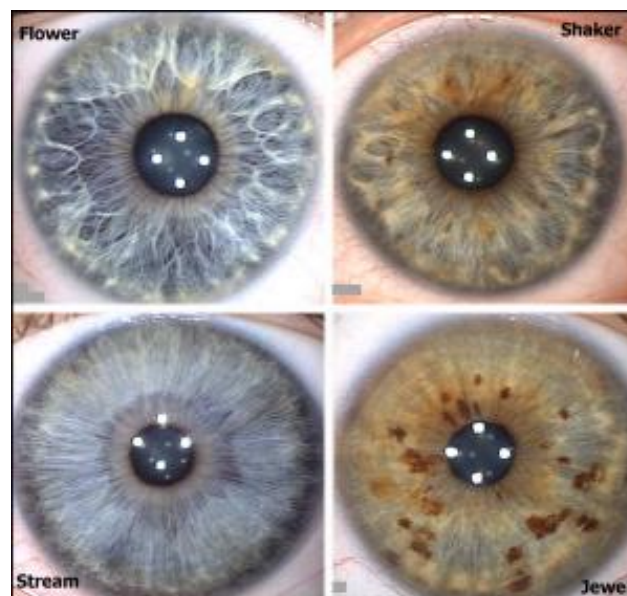


Figure 2. Four Main Types of Iris

The organization of this paper as follows: Matching with correlation in section II. The system overview in section III. The Experiment results in section IV. The conclusion in the last section.

2. Matching with Correlation

Matching is important step in iris recognition system that evaluates the similarity between original eye image and the input eye image to the system [4]. There are researches used Hamming distances for matching [5-8]. The other research used Normalized correlation for matching [9]. In [10-11] used Euclidean distance for matching. In [12-14] used Band-limited phase only correlation for matching. The recent researches are: in [15] used Harris algorithm for matching. In [16] used Scale Invariant Feature Transform (SIFT) for matching. In [17] used SURF for matching.

This paper study used SURF for matching of four main types of iris (Jewel, flower,

stream, and shaker).

3. System Overview

Figure (3), shows an overview of study system. At first read an iris photo and convert it into gray image. And then select a specific region to extract features. This study uses all region of iris to extract 100 strongest features using SURF algorithm to get a unique matching degree.

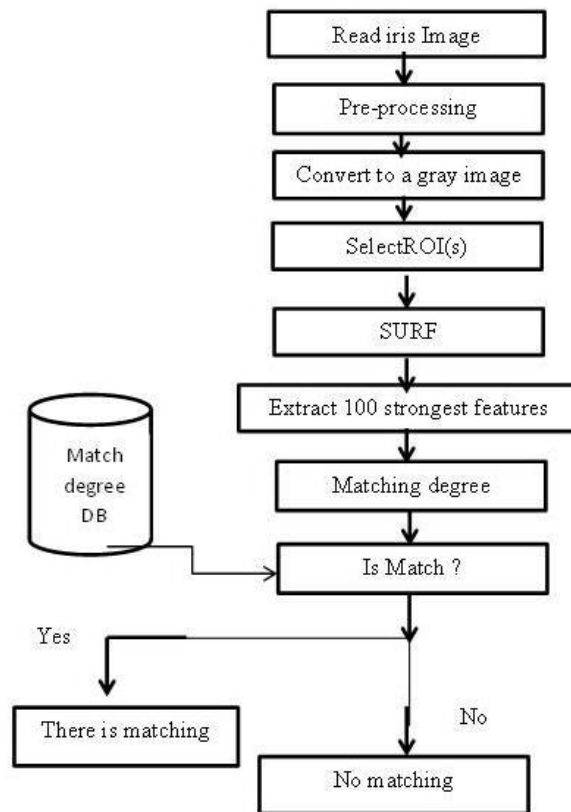


Figure 3. Overview of Study System

4. Experimental Results

Figure (4), shows study samples of four main types of iris (Jewel, flower, stream, and shaker). Figures (5-8), show study matching of these samples between each other. Tables (1-4), show the results of matching degree in this study. The results show the study method has fast, efficient and adequate with iris scanner devices to find a unique strongest features and matching degree.

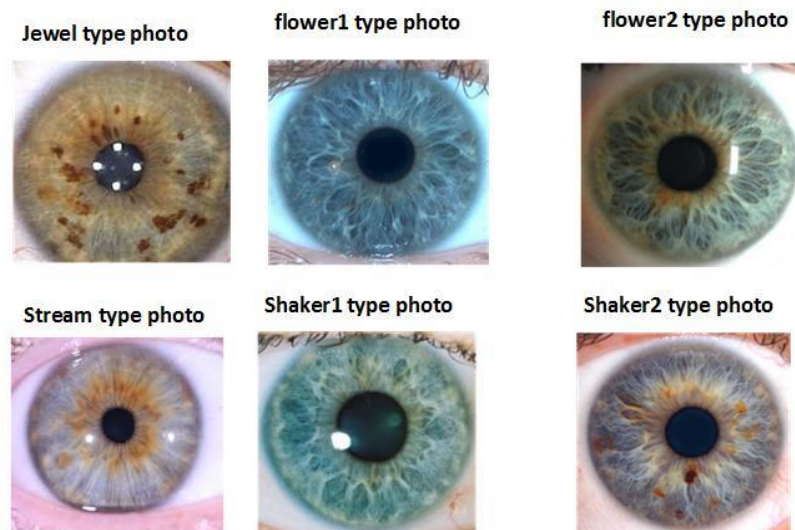


Figure 4. Study Samples

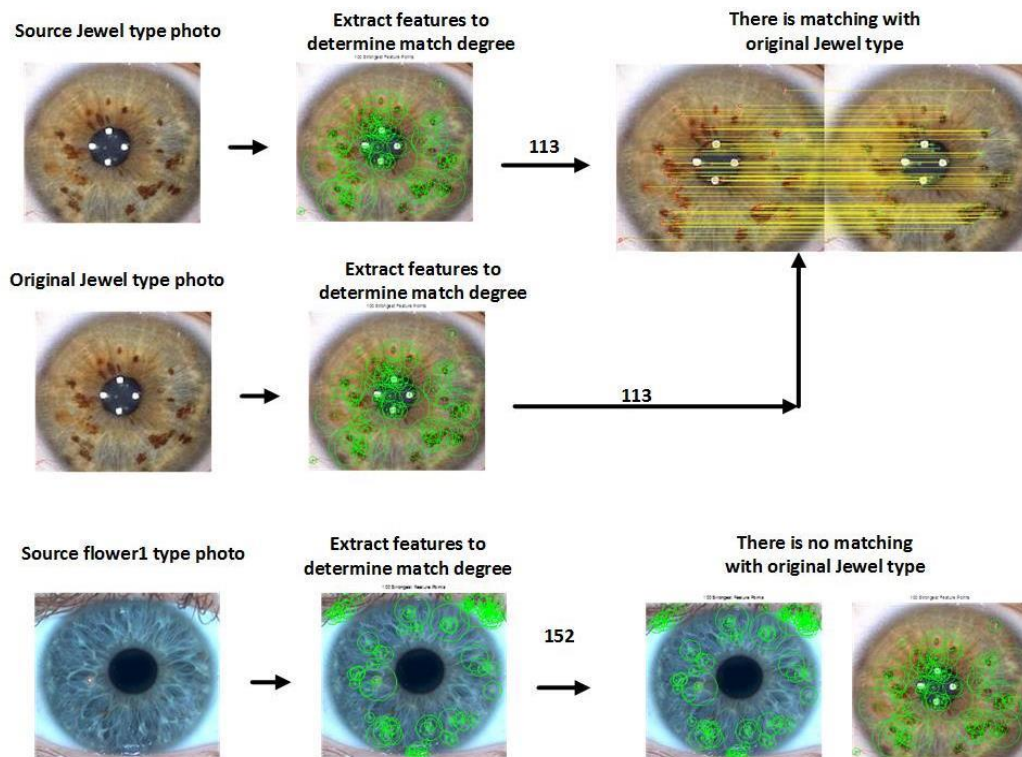
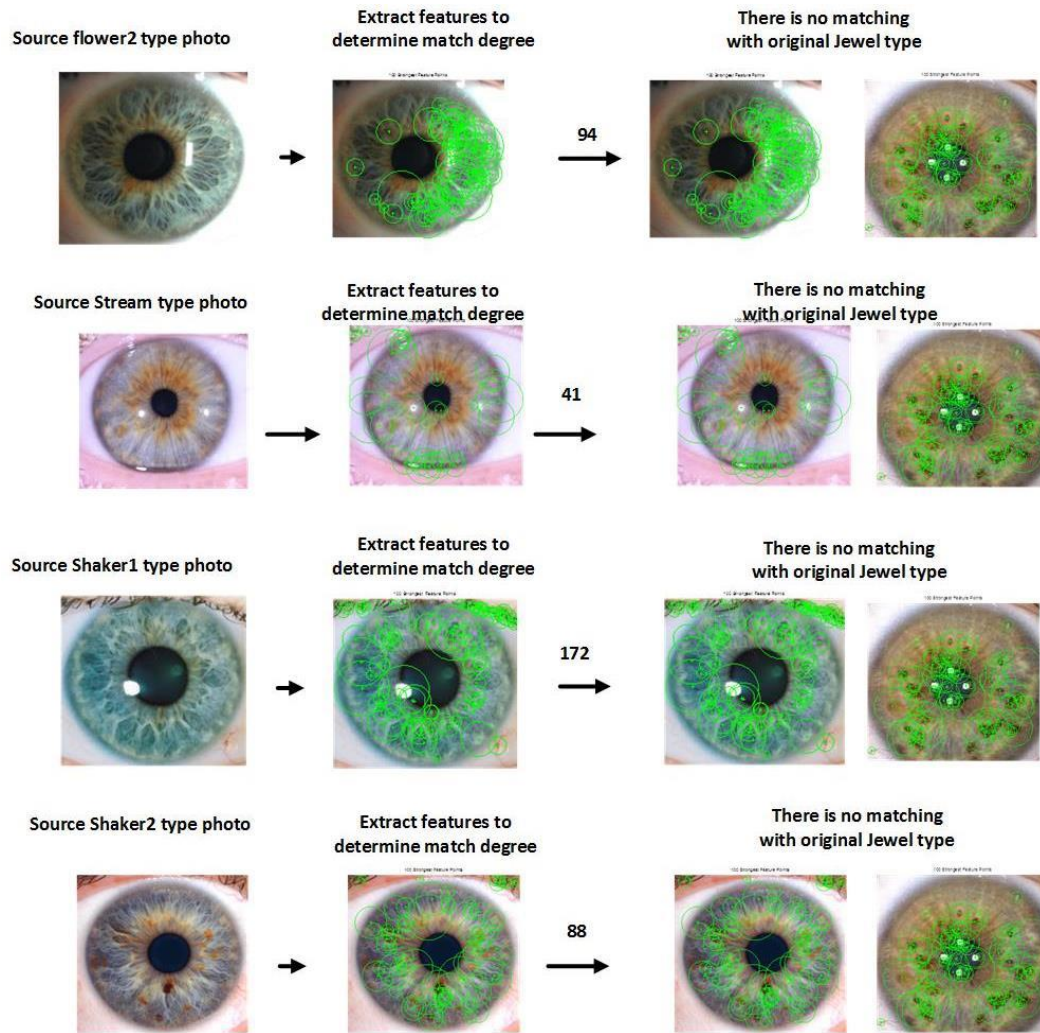


Figure 5. Study Matching of Samples with Jewel Iris Type (Continued)



Supplement of Figure 5. Study Matching of Samples with Jewel Iris Type

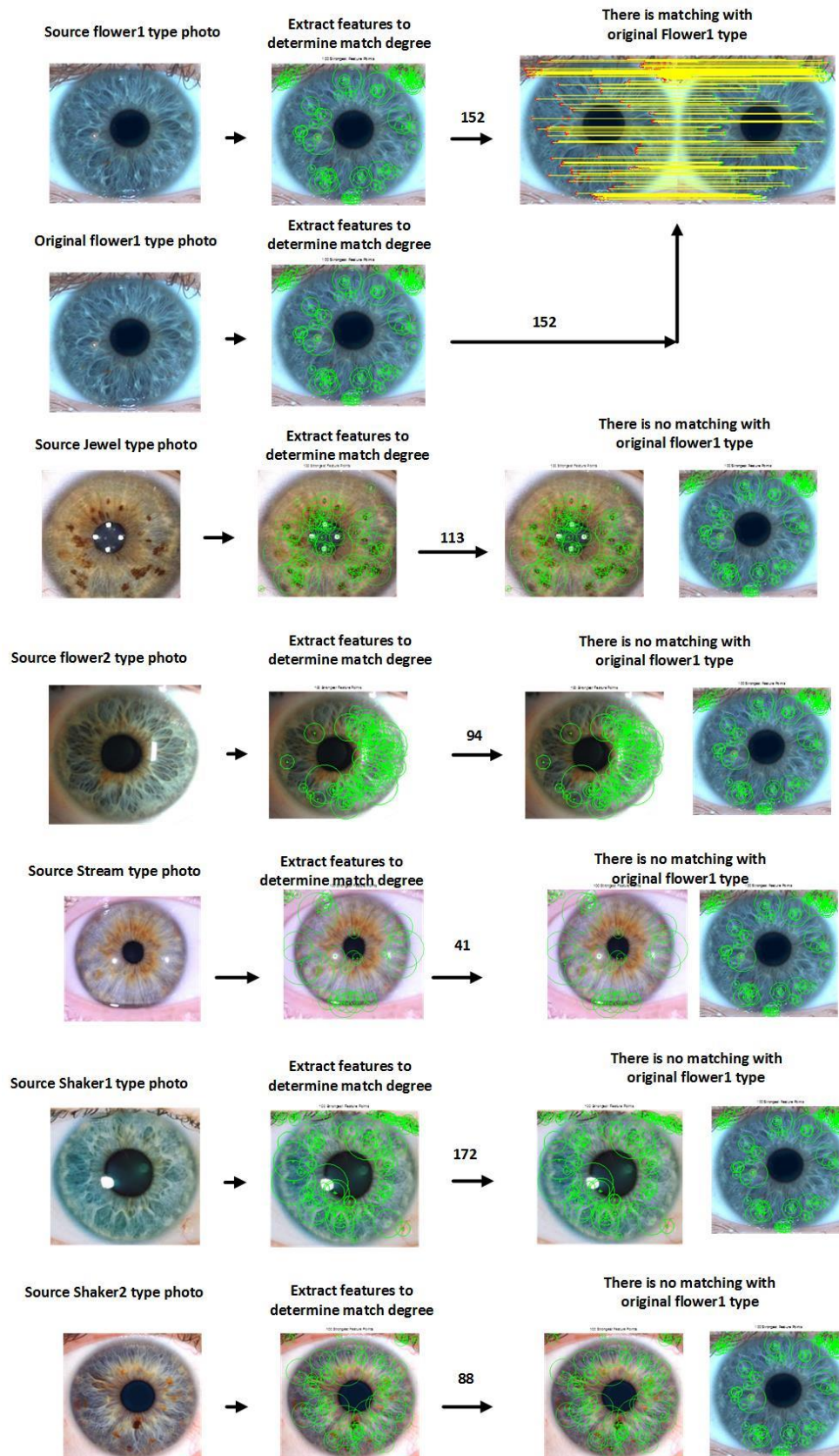


Figure 6. Study Matching of Samples with Flower 1 Iris Type

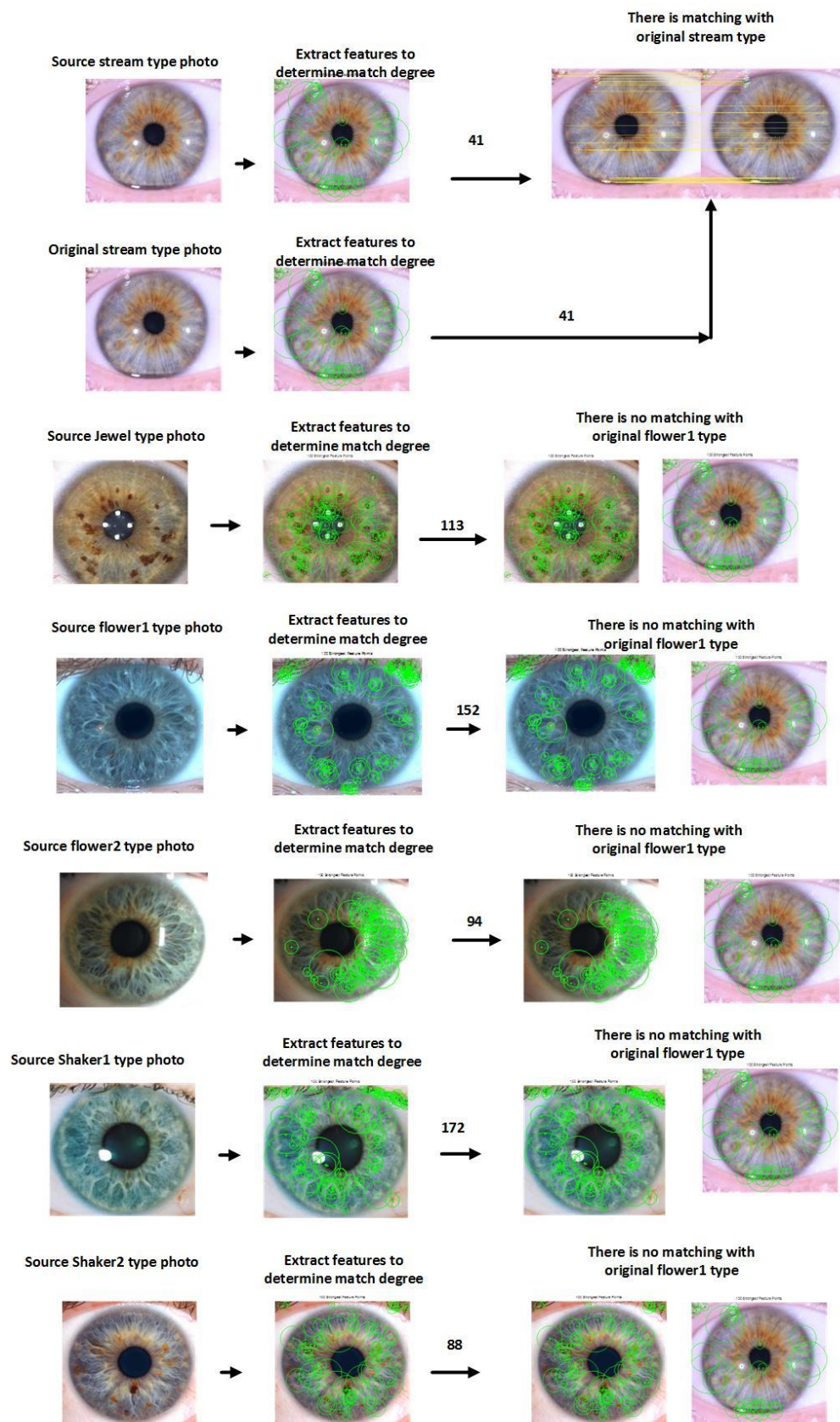


Figure 7. Study Matching of Samples with Stream Iris Type

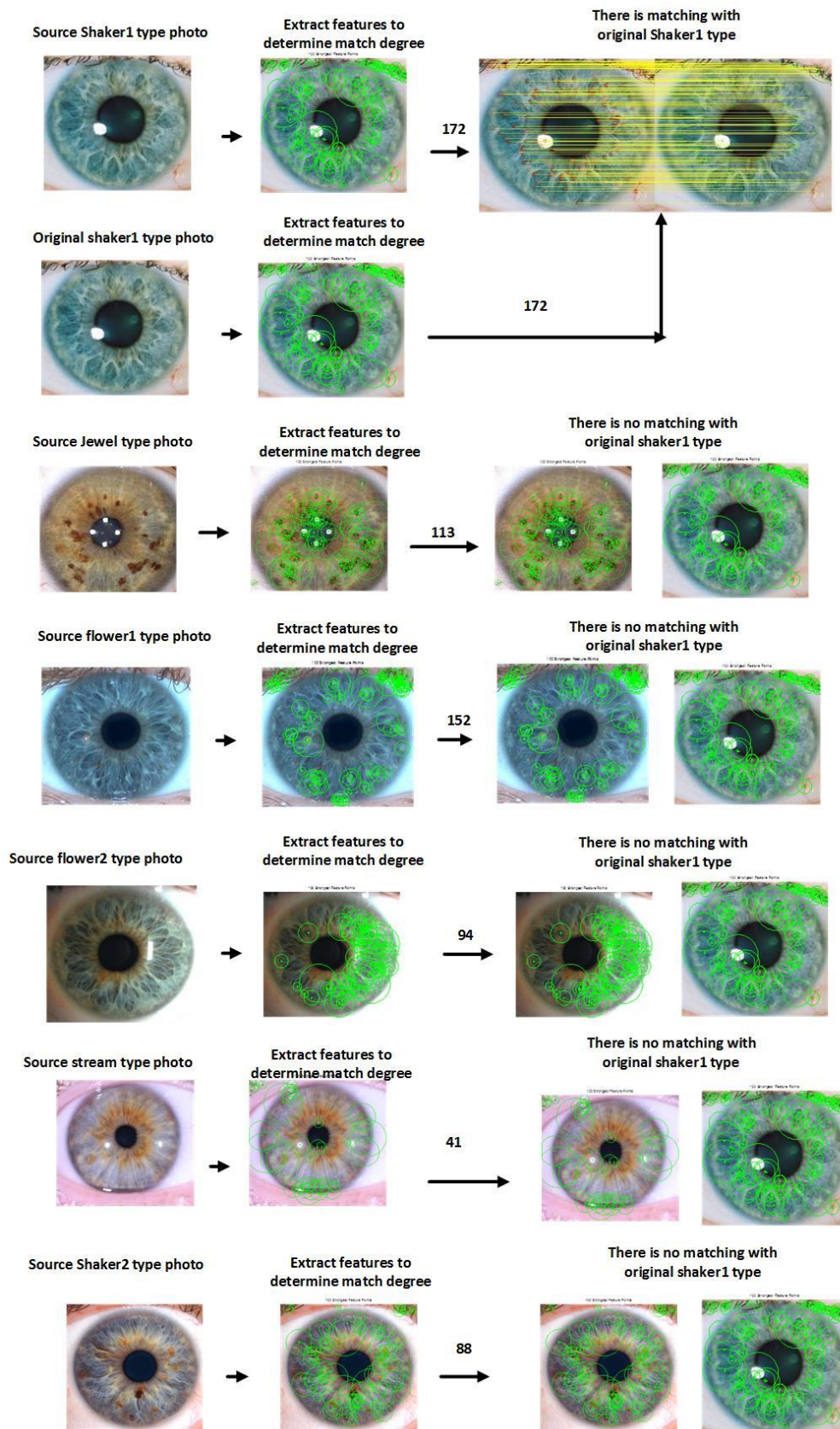


Figure 8. Study Matching of Samples with Shaker 1 Iris Type

Table 1. Matching Degree of Samples with Jewel Iris Type

Iris Type	Matching degree	Match or not?
jewel	113	Yes
jewel	113	
Flower1	152	No
jewel	113	
Flower2	94	No
jewel	113	
Stream	41	No
jewel	113	
Shaker1	172	No
jewel	113	
Shaker2	88	No
jewel	113	

Table 2. Matching Degree of Samples with Flower 1 Iris Type

Iris Type	Matching degree	Match or not?
Flower1	152	Yes
Flower1	152	
Jewel	113	No
Flower1	152	
Flower2	94	No
Flower1	152	
Stream	41	No
Flower1	152	
Shaker1	172	No
Flower1	152	
Shaker2	88	No
Flower1	152	

Table 3. Matching Degree of Samples with Stream Iris Type

Iris Type	Matching degree	Match or not?
Stream	41	Yes
Stream	41	
Jewel	113	No
Stream	41	
Flower1	152	No
Stream	41	
Flower2	94	No
Stream	41	

Shaker1	172	No
Stream	41	
Shaker2	88	No
Stream	41	

Table 4. Matching Degree of Samples with Shaker 1 Iris Type

Iris Type	Matching degree	Match or not?
Shaker1	172	Yes
Shaker1	172	
Jewel	113	No
Shaker1	172	
Flower1	152	No
Shaker1	172	
Flower2	94	No
Shaker1	172	
Stream	41	No
Shaker1	172	
Shaker2	88	No
Shaker1	172	

5. Conclusion

Iris recognition has explosion of interest in iris biometrics at recent years. This paper study SURF algorithm in matching of 4 iris types and the results show the method has fast, efficient and adequate with iris scanner devices.

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