Cattle identification based in biometric features of the muzzle

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ABSTRACT

Cattle identification has been a serious issue for breeding association. The muzzle pattern that is correlated with human fingerprints has been considered as a biometric marker for cattle and could be used in identification of bovine animals

This work presents a robust and fast cattle identification scheme from muzzle images using Speed-up Robust Features matching. To eliminate miss-matched outliers a matching refinement technique based on the matching orientation information has been proposed.

CONCLUSIONS

The points extracted from the muzzle pattern images are a good feature for the cattle identification problem especially to handle noisy data. The SURF approach and the proposed matching refinement technique can be a potential method for the beef cattle identification based on the photo image of the muzzle pattern. We obtained a 100% correct identification in all the fourteen experiments.

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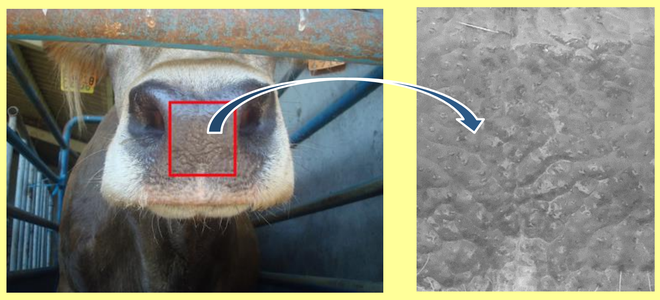
Introduction

The importance of animal identification has been considered since a long time ago in applications such as cattle classification, cattle tracking from birth to the end of food chain, and understanding animal diseases trajectory and population. Now a robust cattle identification method is an important part for consumers and food industry since the usage of robust cattle identification is related to traceability and registration for breeding and marketing. The muzzle pattern that is correlated with human fingerprints has been considered as a biometric marker for cattle and could be used in identification of bovine animals. We propose to use muzzle photos and applying SURF method to extract and match features between two images.

Materials and Methods

Data Acquisition

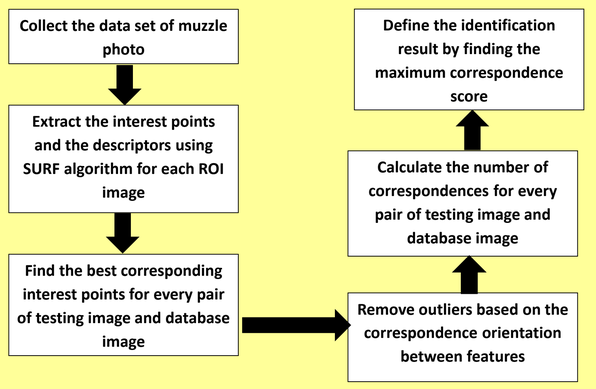
The muzzle photos have been taken from fourteen animals. The muzzle photo of each individual has been taken five times. Basically the four muzzle photos of each individual are used to create a training database and the other one is used in the testing phase. The nose was cleaned to eliminate snot using tissues. In every muzzle photo, a rectangle region centered on the minimum line between the nostrils is taken as the region of interest (ROI).



Proposed Recognition Method

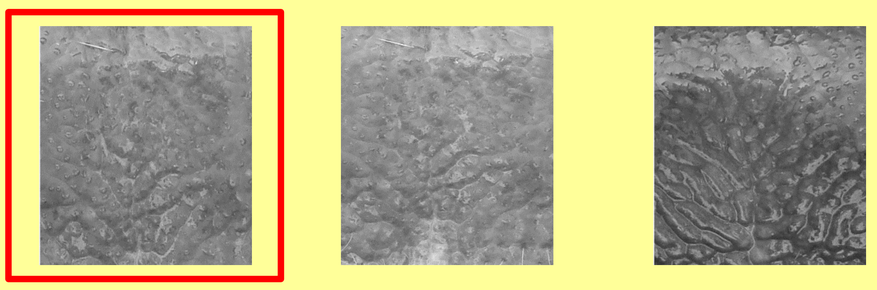
Speed-Up Robust Features (SURF) has been claimed as a method for the object recognition. It is a local feature detector and descriptor.

The proposed recognition method can be summarized as follows:

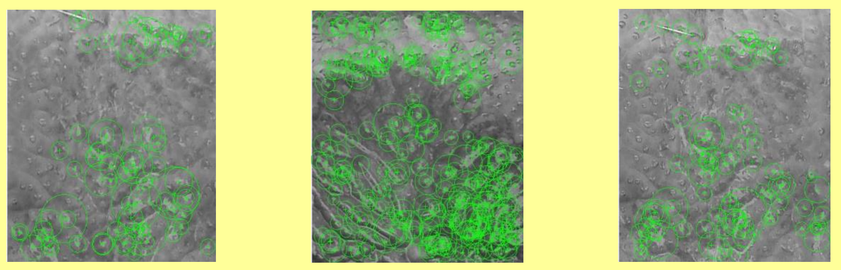


Experimental Results

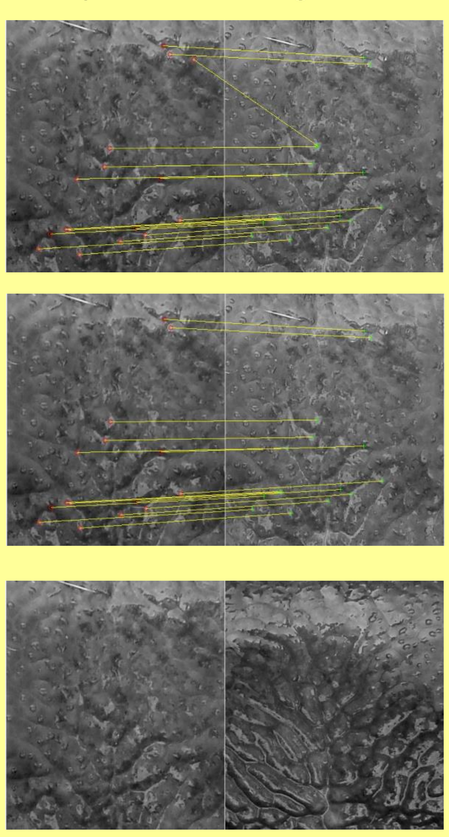
In this section we present the results obtained by the proposed method using one test image and two training images from the database.



The matching process is initiated by detecting the SURF features in each image.



The next step is to extract the feature descriptors at interest points in both muzzle images. In the matching process we find putative point correspondences using feature's descriptors.



a)

b)

Score = 26

c)

Score = 0

	Animal 1	Animal 2	Animal 3	Animal 4	Animal 5	Animal 6	Animal 7	Animal 8	Animal 9	Animal 10	Animal 11	Animal 12	Animal 13	Animal 14
Animal 1	6	0	0	0	0	0	0	0	0	0	0	0	0	0
Animal 2	0	53	0	0	0	0	0	0	0	0	0	0	0	0
Animal 3	0	0	8	0	0	0	0	0	0	0	0	0	0	0
Animal 4	0	0	0	26	0	0	0	0	0	0	0	0	0	0
Animal 5	0	0	0	0	9	0	0	0	0	0	0	0	0	0
Animal 6	0	0	0	0	0	6	0	0	0	0	0	0	0	0
Animal 7	0	0	0	0	0	0	12	0	0	0	0	0	0	0
Animal 8	0	0	0	0	0	0	0	14	0	0	0	0	0	0
Animal 9	0	0	0	0	0	0	0	0	10	0	0	0	0	0
Animal 10	0	0	0	0	0	0	0	0	0	4	0	0	0	0
Animal 11	0	0	0	0	0	0	0	0	0	0	3	0	0	0
Animal 12	0	0	0	0	0	0	0	0	0	0	0	8	0	0
Animal 13	0	0	0	0	0	0	0	0	0	0	0	0	26	0
Animal 14	0	0	0	0	0	0	0	0	0	0	0	0	0	1

The figure a) ilustres the matching process with an outlier. Figure b) shows the result after applying the refinement method.

In c) there aren't any correpondence so we can conclude that this images don't belong to the same animal.

The table presents all the matching results obtained from every tested animals.