

ALGORITHM FOR IMPROVING THE QUALITY OF IMAGE FOR THE PERSON IDENTIFICATION

Jumayev Turdali Saminjonovich

PhD at the Department of “Modern Information and Communication Technologies” of International Islamic Academy of Uzbekistan
turdali240483@gmail.com

Tukhtanazarov Dilmurod Solijonovich

PhD at the Department of “Modern Information and Communication Technologies” of International Islamic Academy of Uzbekistan
dtuxtanazarov@gmail.com

ABSTARCT

Algorithm for improving the quality of image on the base of modified Retinex method is worked out.

The method and algorithms of identification of a person based on a face image occupy an important place among biometric technologies [1-2]. Factors such as the data reception characteristics of technical devices and light levels during shooting can have different effects on image quality. If the image quality is bad, it needs to be improved. Because it is difficult to find facial features in low-quality images. There are various ways to improve image quality. For example, strengthening the borders, eliminating the destruction, increasing the clarity, etc.

Purpose of work. It consists in improving the quality of the face image using a modified Retinex algorithm.

Statement of issue. Suppose, given a face image of the same size:

$$\{T_1, \dots, T_i, \dots, T_m\}, T_i = \|t_{ij}\|_{x \times y},$$

where x -image width, y -image height. The main issue is to process given face images based on modified Retinex algorithms and use them in person recognition.

A way to solve the problem. Adequate lighting is necessary to obtain a quality image of the object. Image brightness outside of special conditions is not always ideal. The human visual system easily adapts to such conditions[3-5].

Some of the more common image problems are:

Low light. Light is one of the most important aspects of an image. Lack of light causes images to lose color and detail and become practically indistinguishable.



Figure 1. Low-light face image

Overexposure. Mirrors, sunlight, and other uncontrollable sources of light can cause problems with field lighting, especially if they are directly in the image, making the problem even more difficult. Photographing people standing in front of mirrors is a difficult but common problem of overexposure[6-8].



Figure 2. Overexposed face image

Modified Retinex algorithm. The following algorithm is proposed in space, taking into account that the component corresponding to the illumination reflects the distorted original image:

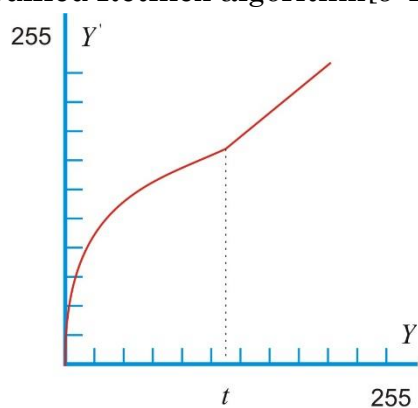
- 1) $Y_1 = \log Y(x, y)$
- 2) $Y_2 = \text{bluring} Y(x, y)$
- 3) $Y_{new} = e^{(Y_1 - Y_2 \cdot k)}$

k - a fixed number specifying the modified Retinex action force.



Figure 3. Block diagram of the modified Retinex algorithm.

In dark areas, it is necessary to increase the brightness without changing the brightness. For this, it is advisable to perform the following clarity (t parametric) substitution before executing the modified Retinex algorithm[9-10].



$$Y' = \begin{cases} Y & , Y \geq t \\ \frac{Y^{0.24} \cdot t}{Y^{0.24}} & , \text{else} \end{cases}$$

Figure 4. Brightness toggle.

The results obtained based on the algorithms mentioned above are presented below.



Figure 5. a) the given image, b) the result obtained from the modified Retinex algorithm

SUMMARY

It should be noted that by processing the image, improving its quality, normalizing the image of the face, etc., provides an opportunity to more accurately find indicators in the image. Algorithms and a software tool for improving the quality of face images were developed based on the proposed algorithms. As can be seen from the obtained result (Figure 5), the modified Retinex algorithm gives better results. Image Enhancement Algorithms This algorithm took 0.03 seconds to enhance a face image of size (124×228) . It can be seen that it is appropriate to use the modified Retinex algorithm in solving practical problems.

REFERENCES

1. Фазылов Ш.Х., Мирзаев Н.М., Жумаев Т.С. Формирование набора репрезентативных признаков изображений лица и ушных раковин в задачах идентификация личности // Труды. Российского научно-технического общества радиотехники, электроники и связи имени А.С. Попова \ 12-я Международная конференция и выставка \ Добрады \ Серия: Цифровая обработка сигналов и ее применение Выпуск: XII-2: ст. 62-65. DSPA-2010. Москва, Россия.
2. Мирзаев, Н. М., Тухтасинов, М. Т., Жумаев, Т. С., & Каримов, И. К. (2015). Формирование набора характерных признаков изображений лица при идентификации личности. НАУКА, ОБРАЗОВАНИЕ, ИННОВАЦИИ: ПУТИ РАЗВИТИЯ, 84-88.
3. Мирзаев, Н. М., Раджабов, С. С., & Жумаев, Т. С. (2008). О параметризации моделей алгоритмов распознавания, основанных на оценке взаимосвязанности признаков. Проблемы информатики и энергетики, (2-3), 23-27.
4. Жумаев, Т. С., Мирзаев, Н. С., & Махкамов, А. С. (2015). Алгоритмы сегментации цветных изображений, основанные на выделение сильносвязанных элементов. Исследования технических наук, (4), 22-27.
5. Жумаев, Т. С. (2018). Алгоритмы предварительной обработки изображений в биометрических системах: Автореф. дисс.... докт. филос.(PhD) по тех. наукам. Т.: ТУИТ, 47.

6. Zhumaev, T. S., Mirzaev, N. S., & Makhkamov, A. S. (2015). Algorithms for segmentation of color images based on the selection of strongly coupled elements. *Studies of Technical Sciences*,(4), 22(27), 4.
7. Saminjonovich, T. J. (2022). Algorithm for extraction of identification features in ear recognition. *ACADEMICIA: An International Multidisciplinary Research Journal*, 12(1), 232-237.
8. Saminjonovich, J. T., Solijonovich, T. D., & Qizi, I. M. F. (2023). Recognising visuals by artificial intelligence in the field of information security in religious educational organizations. *ACADEMICIA: An International Multidisciplinary Research Journal*, 13(1), 1-6.
9. Mirzayev, N. M., Radjabov, S. S., & Jumaev, T. S. (2016). Isolation of characteristic features of facial images in personality recognition problems. *Neurocomputers and their application*.-2016.-S.
10. Boburbek Toiro'g'li, T., Saminjonovich, J. T., & Otabek Toiro'g'li, T. (2021). Ob'yektlarni Tanib Olishda Neyron Tarmoqning O'рни. *BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI*, 1(6), 681-684.