

# Study of Methodology of Optimizing Image Segmentation and Processing Using Genetic Algorithm

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## ABSTRACT

*In the literature, several works focal point on the description of contrast metrics and standards that allow to count the overall an image processing algorithm performance. These assessment standards can be investigated to outline new photo processing algorithms by way of optimizing them. In this work, we suggest a universal scheme to phase photographs with the aid of a genetic algorithm. The developed approach makes use of an estimation standard which counts the first-class of a photo segmentation outcome. The suggested type segmentation approach can combine a local ground reality when it is accessible in order to set the preferred degree of the last result accuracy. A genetic algorithm(G-A) is then investigated in sort to decide the first-rate mixture of statistics excerpted with the aid of the chosen standard. Then, we exhibit that this method can either be utilized for gray-levels or multicomponent snap shots in a supervised context or in an unsupervised one. Last, we exhibit the efficiency of the suggested approach via several experimental outcomes on a number of (levels of gray) and multi-components images.*

**Key Words:** Genetic Algorithm, Image Segmentation, Image Processing, Optimization.

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## 1. INTRODUCTION

Some of the works relied on the genetic algorithm called (GA) for image processing and input operations and for special digital image segmentation operations, since the use of image division methods is one of the most useful patterns in order to find the special regions that are called golden regions according to the criteria Therefore, a new design and pattern was found and discovered that uses the genotype [1] for the goal to be obtained in this study. In fact, hashing operations are considered environmentally friendly operations when there are specific research goals, and the benefits of fragmentation and genetic algorithm lie when we have a numerical problem in the optimization criterion and this happens in Most of the time when processing any digital image, the algorithm is therefore more able to identify more effective groups and give the final output of the process [2], segmentation, and a process for selecting and selecting some elements from the input, as well as measuring the window of the special segment and some special thresholds that are useful in guiding operations in digital images [2,3].

The proposed algorithm is considered a method for general-purpose optimization and is considered the basis of random search and depends on common factors with the iterative algorithm (periodic recursion). The algorithm relies on the idea of improving the textures in the original images for the images that are generated. This algorithm applies carefully selected selection factors and works on gray levels and gradients. Also for images, extracting features and features, as well as distinguishing the special areas in each image that are processed by this algorithm.

In this study, we depended on a conventional structure of <levels of gray> and multi-objects picture segmentation that involves [3]. G-A is employed right here like an optimization approach for the most effective aggregate of segmentation whose 1-class is counted with a comparison standard. We outline an accepted scheme to outline segmentation techniques via means of optimization. Note that we attempt in this work to consider the dependability of the health features we investigated in our way [2].

## 2. FUNCTIONS AND METHOD

The developed technique consists in searching for the most reliable aggregate of segmentation consequences with the aid of taking into account a contrast criterion and through the use of a (G-A). We outline in the next subsections several comparison standards for one-of-a-kind functions regarding the segmentation process [4].

**2.1. Speaking of evaluation principles, we can classify evaluation groups into three groups as follows:**

- 1) The “type of analytical” which allow to signify an algorithm in phrases of needs, values, complexity, stability, convergence [3], and very forth, except any reference to the algorithm specific application or checking out information.
- 2) The “empirical goodness type” additionally referred to as unsupervised standards which calculate a health metric on the result segmentation. They make now not require any understanding on the segmented pics to examine and their ideas consist in an approximation of the exceptional of a segmentation end result in accordance to several records calculated on each area, category, texture or fuzzy set noticed [4], typically regularly with the aid of the use of a statistical factor of view.
- 3) The “experimental contradiction type” additionally referred to as supervised standards which calculate several measures of difference between a segmentation end consequence and the preferred segmentation end result. They accordingly check the best of a segmentation end result via the usage of an a priori knowledge. This expertise can be a segmentation end result employed like a reference which is referred to as floor reality (G-T) or some know-how on the factors to recognize [2][5].

We core of pastime is to consider the best of a segmentation result, for that reason the analytical standards are no longer calculated in this work [5]. Furthermore, we have preferred for this learn about to focal point on standards which verify area segmentation consequences due to the fact it is a complicated problem. In the subsequent unit, we learn about several unsupervised assessment standards.

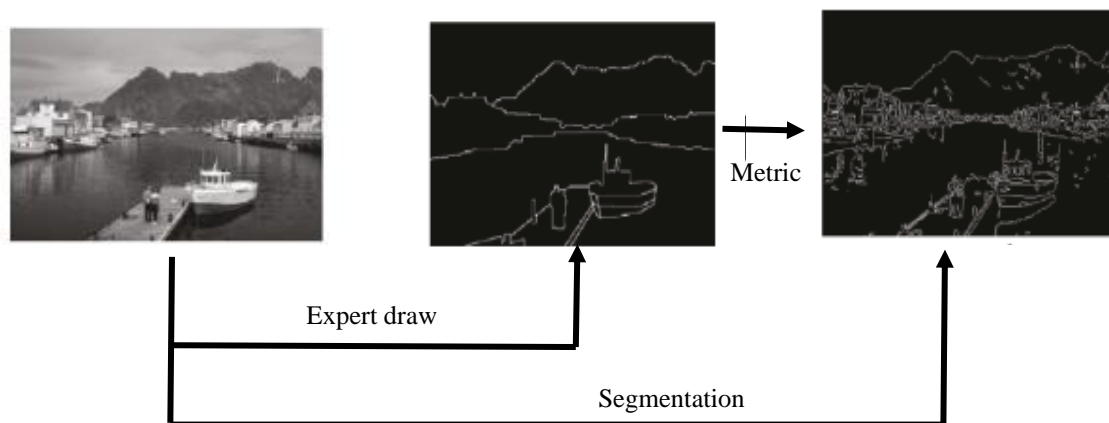
**2.2. As for the non-performance evaluation:**

Unsupervised comparison standards provide the records on the segmentation consistence end result excellence. The most important goal of a preceding paper introduced in [6] used to be to decide the supervised comparison criterion, inside a decision of standards from the work, having the great conduct in contrast with social specialists' judgment. To acquire this goal, two predominant steps were comprehended (Table1). The first one worries the rating of segmentation outcomes of some photographs via way of human specialists [7].

**Table1 Comparison table for SRCCVinet standards**

Criteria	Inter2	Rosenberger	Z-eboudj	Intra-inter	Intra3	B-orsotti
Overall SR-inet	66.09	58.85%	50.40%	37.65%	36.63%	20.53%
Uniform SR-inet	73.76%	55.74%	89.46%	68.90%	1.18%	65.76%
Mixed SR-inet	71.93%	57.81%	57.56%	34.27%	33.56%	29.21%
Textured SR-inet	73.81%	63.96%	37.23%	27.49%	23.71%	17.12%
Textured2 SR-inet	34.63%	62.35%	18.13%	35.23%	7.67%	11.25%

the advent of a similarity works capable to evaluate the assessment conduct of the professionals and of a special to study (Figure1). Therefore, S-R-C-C (similarity charge of right evaluation criterion) has been described [7]. It computes the same of judgment given with the aid of an assessment principle and a proficient. In our research, the Vinet’s criterion was resolved as the one with the fantastic conduct in accordance to the human experts [8].



**Figure1 Image segmentation results according to supervised evaluation criteria**

### 3. CIRCULAR FOR MULTIPLE COMPONENTS

In this research, here we generalize and clarify the contrast standard that is not subject to the supervision process for images that have many components and features [9]. The goal we seek here is the final product of segmentation according to this special algorithm that we obtained according to specific parameters resulting from the combination and merging of the standard values of contrast According to each scope, and here we use three algorithms and methods that are considered and are called integration algorithms and methods: the minimum cost, the maximum cost, and the unified cost for the calculated criteria For each domain by itself, and in order to examine the specific and distinctive evaluation methods when we have images with multiple features, we will use here an intermediate set of images consisting of many properties, each of which has been segmented according to the required algorithm according to the hashing techniques (ML) and using a number of parameters and parameters with Measuring (special Vinet), which is one of the main features that allows a single observation of each output of the images coming out of the processing process according to the algorithm [10].

### 4. GENETIC ALGORITHMS

Genetic algorithms decide the highest quality fee of a criterion with the aid of simulating the process of a populace until survival of nice outfitted men and women [11]. The survivors are humans bought by way of crossing and the mutation, and determination of men and women from the preceding generation. We suppose that (G-A) is a proper applicant to discover out the most effective aggregate of segmentation effects for two important aims. The first one is due to the reality that a contrast criterion is no longer very effortless to discriminate. (G-A) is an optimization approach that does now not important to differentiate the health feature however solely to consider it.

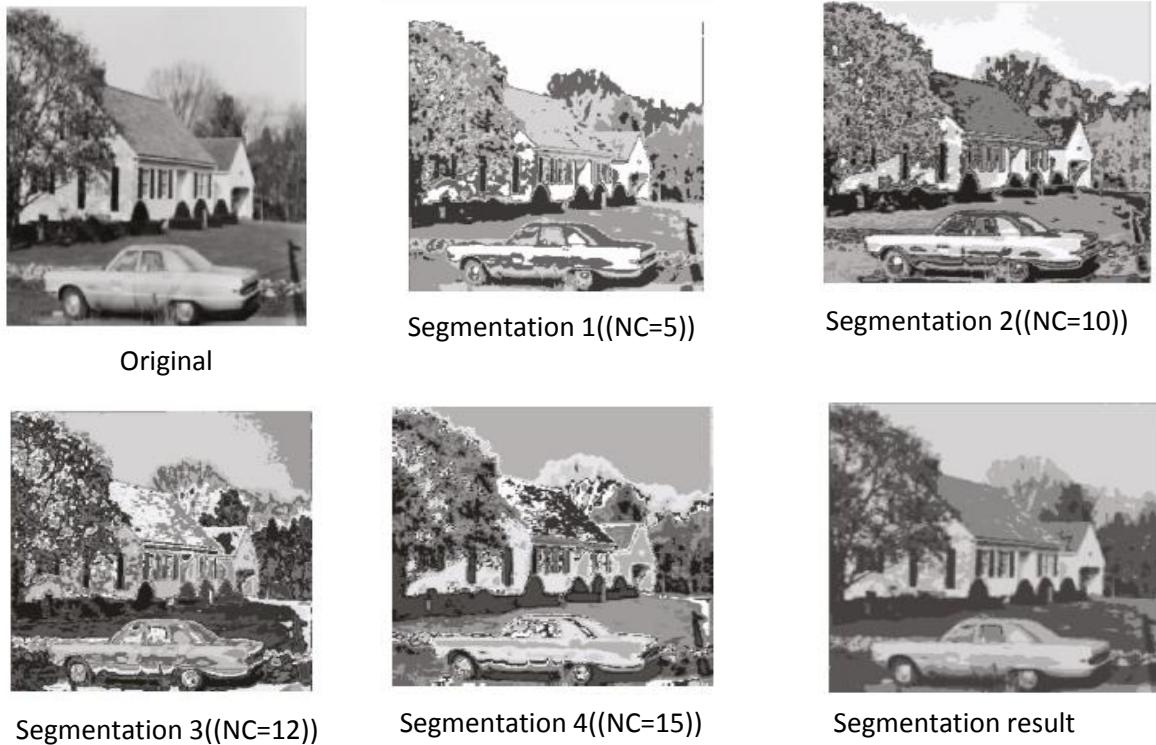
then, if the populace is enough imperative thinking about the dimension of the exploration space [12], we have good ensures that we will attain the most beneficial fee of the suitability (Figure2).

G-A is described with the aid of thinking about five section of data:

- (1) genotype: the process of segment end result on picture I is regarded as an person defined by means of the classification of every pixel[12],
- (2) preliminary population: a set of men and women characterized by using the types. It is not the same of the segmentation-p consequences to syndicate,
- (3) health function: this feature allows us to enumerate the health of an character to the surroundings via thinking about its genotype[13]. The contrast standards show in the preceding sections can be used as a health feature And here in this case, the pattern is unattended, or whether it is a controlled case,
- (4) Specific factors on the types of genes: they outline changes on geno-types in order to do the populace evolve all through generations. Three kinds of workers are investigated:
  - (A) Single mutation: In this case [13], the variables are in sort to improved adapt to the surrounding environment, so that the irregular alteration and the random process are used

$$X_i = \begin{cases} X_i + (b_i - X_i)F(G) & \text{if } r1 < 0.5 \\ X_i - (b_i - a_i)F(G) & \text{if } r1 \geq 0.5 \end{cases} \dots \dots \dots (1)$$

**r1, r2:** numbers between [0, 2] , **ai, bi:** decrease and top sure of Parameters xi  
**G:** the modern-day generation, **b :** a structure parameter



**Figure.2 segmentation result of image**

(B) Decision of an individual: persons that are now not tailored to the surroundings do now not live to tell the tale to the subsequent generation. We used the same rating determination technique which describes a likelihood  $P_i$  for every character  $i$  to be chosen as follows [13,14].

$$F(G) = \left( r2 \left( 1 - \frac{G}{G_{max}} \right) \right) \dots \dots \dots (2)$$

**q:** the chance of deciding on the exceptional individual, **r:** level of individual, the place 1 is the best , **n:** the dimension of the populace

(C) Crossing stage so that two types of genes and common factors can be combined in order to create the new variety [15].

$$P_i = \frac{q(1 - q)^{(r-1)}}{1 - (1 - q)^n} \dots \dots \dots (3)$$

X, Y: original genotype, a: a quantity [0, 1], X, Y: type for linear structures of the original

## 5. THE RESULTS

In this paper, we exhibit the consequences of two kinds of experiments. First, we do the before introduced approach to section grey degrees' photographs by means of combining a number of segmentation results. Second [16], [17], we current several(G-A) effects of multispectral images. These photo shad been received with a C-A-S-I (Compact.Airborn. S-Img) (Figure3).

For all results, we usual the fee of the decision likelihood to 9%, the intersecting chance to 62% and the alteration chance to 8.0%. The unsupervised assessment principle we do in this study is the Rosenberger's one due to the fact of the presence of textures in take a look at images [18].



Figure 3 Segmentation using the algorithm

**5.1 Classification of gray-level images according to genetic stratification:**

First, we exhibit It is the output of the process of the unattended algorithm grey ranges picture referred to as (CAR) This photograph was once segmented the use of the K-means algorithm with suggest and variance like characteristics with exceptional numb of bunches N-C (N) which establishes the early population for the (G-A) [19]. Here, the genotype of a character is a dimension vector (the measurement of every photograph is (512\*512 p). A gene matches with every pixel label in the viewed segmentation result. Ending result indicates the effectivity of the suggested way. If we appear at the tree in left of the image, we understand that this surfaced location is no longer over like in the segmentation effects we investigated in the preliminary population. The vital factor is that we prepared now not require in this test the wide variety of bunches we required. It was robotically decided (NC = 6) [20].

**5.2 The practical section and the code for the study:**

In the practical section [20], we used the Matlab program to represent the process based on image segmentation and using a simple example on one image (sunset) with giving the output states resulting from the algorithm’s work according to the specified code. The following figures show the output resulting from the segmentation process using the studied algorithm according to the Figure4 [21].

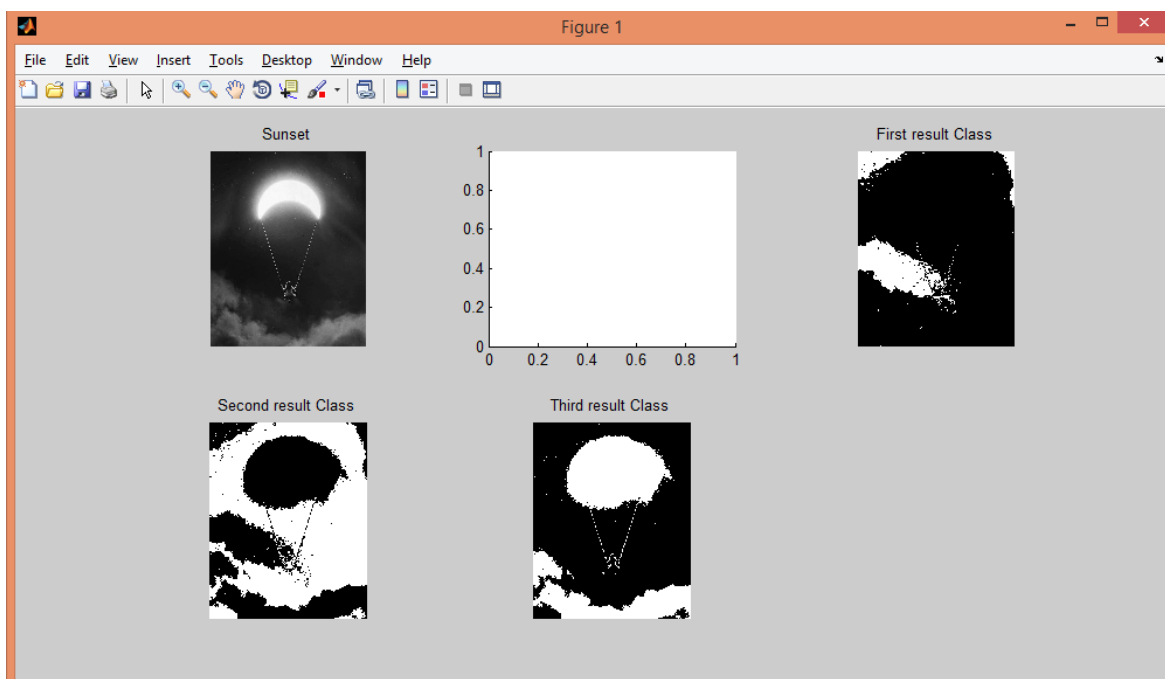


Figure4 The result is on the studied image

We in contrast the administered strategy and the un-administered one via segmenting the equal photograph AERIAL as indicated in table2. Each according to its own label [21], to know the level that has been worked on [22]. The assessment effects are unique in Table Two These consequences exhibit that the contrast standard CR is greater in the un-administered event [23]. This displays the potential of the un-administered strategy to decide the most advantageous fee of CR whilst the use of a floor reality lets in us to fit the stage of accuracy of the segmentation end result [24-26].

**Table 2 Values of the assessment criterion by way of the usage of the supervised and unsupervised methods to phase AERIAL**

Method	R(Is, GT)	CR(Is)	D(Is)	D(Is)	R(Is, GT)
Supervised-l	95.6%	0.148	0.203	0.014	95.6%
Unsupervised-l	--	0.285	0.458	0.033	--

**6. CONCLUSION**

In this study, we have defined the method and pattern of the genetic image segmentation algorithm with a questionnaire through two tables compared with other techniques and a set of images on which the sham genetic algorithm has been applied. So that the images resulting from the process are generated by collecting specifications and special elements from the original images. The program reads a specific image by the user and with the implementation the division algorithm works automatically and gives the final output with one interface and arranged images, each according to its own label, to know the level that has been worked on.

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