A False Positive Decision on the Patient Skin Based on the Statistical Parameters and Visual Quality Measures of Skin Images after Applying Morphological Filters

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Abstract: This paper is describing about the statistical parameters / boundaries and visual quality proportion of skin pictures in the wake of applying morphological channels. An extraordinary contextual analysis is clarified and executed where a dermatologist settled on a false positive choice on the status of the skin of a patient. This is the most noteworthy aspect of the standard working technique recommended in this paper.

Keywords: Statistical Parameters, Morphological Filters, Dermatologist, Carcinoma, Texture

I. INTRODUCTION

Skin pictures, which contain skin carcinoma, are outwardly discernible, though skin pictures, which seem typical and smooth don't show any indication of skin carcinoma. In such cases, one needs to handle pictures to remove any shrouded manifestation for carcinoma. Morphological sifting is taken a stab at skin pictures to manage this work. A lot of three skin pictures, which give off an impression of being typical are considered for a total contextual analysis. Texturization and morphological handling may help find irregularities in skin pictures that may prompt development of skin carcinoma.

A patient's both ways legs were influenced by parasite and it was expressed that the patient has skin carcinoma in the legs. The shot pictures of both left and right legs are appeared and clarified in contextual analysis.

A. Digital Images - Texturization

Spatially rehashed 'Patterns' are alluded as the term called 'texture'. 'Points' are the spatially rehashed designs for a line and a bend. An essential example called 'motif' could be utilized to shape a surface by tiling the motifs in a necessary way. For instance, Fig. 1 shows a texture framed of a particular motif.

Fig. 1: Sample texture formed of a motif

Some textures are available on every meaningful picture and can be as directional textures. One has eight directions in a digital lattice as shown in Fig. 2.

B. Algorithm for Texturization

{ filter the given picture by a 3x3 void window; at each position read picture pixels shrouded in the nine neighborhood; play out the accompanying tasks: (I) think about a reference course, say 'east'; check the focal pixel esteem with pixel in the cell number '0'; if the focal pixel esteem is not as much as incentive in cell number '0' at that point write in an eight digit register (beginning from left) the worth '0', else compose the worth '1'; rehash this system to cell number '1', cell number '2' up to cell number '7'; the subsequent string in the register will be a paired string; assess what might be compared to this double string and supplant the focal pixel estimation of the picture by this decimal number; rehash this whole method for all pixels in the picture each in turn; the subsequent picture would be the east insightful texturized picture }

One can get eight texturized images by this procedure. Fig. 3(a) shows a sample image and Fig. 3(b) its eight texturized versions.

Fig. 2: Digital lattice eight directions

Fig. 3(a): Sample image
A False Positive Decision on the Patient Skin Based on the Statistical Parameters and Visual Quality Measures of Skin Images after Applying Morphological Filters

C. Skin Images - Morphological Processing

The following 4 points are the definite methodology to complete morphological preparing.

Figs. 4 to 6 show filtered images of all three test case skin images.

1. The given skin picture is texturized a picked way. One can texturize a given picture in eight potential ways. For this situation, north astute texturization is done for each of the nine skin pictures.

2. Morphological channel 1100 (widening enlargement disintegration) is applied to the texturized picture to identify irregularities in the skin.

3. The sifted picture is dyadically duplicated with the first skin picture

4. The coming about picture intently looks like unique picture however with variations from the norm communicated.
II. CONTEXTUAL ANALYSIS – 1

A. Morphological Filtered Skin Images - Statistical Parameters

The first set of 3 skin pictures are examined by statistical parameters and the outputs are framed in table I. Filtered image 1 shows perceivable skin abnormalities, image 3 shows melanoma content and image 2 does not exhibit any perceivable skin abnormality.

Table I: Statistical parameters for images 1, 2 and 3

| Filtered image 1 | Filtered image 2 | Filtered image 3 |
|------------------|------------------|------------------|
| **Pixels Count** | 353847           | 290505           | 433957           |
| **Pixels without black** | 342027          | 279825           | 420877           |
| **Red Min**      | 0                | 0                | 0                |
| **Red Max**      | 248              | 223              | 255              |
| **Red Mean**     | 214.30833948006  | 179.877382489114 | 227.512082994398 |
| **Red Standard Deviation** | 41.064773960355  | 35.288779090204  | 40.7257016684497 |
| **Red Median**   | 223              | 186              | 234              |
| **Red Total Count** | 353847          | 290505           | 433957           |
| **Green Min**    | 0                | 0                | 0                |
| **Green Max**    | 207              | 180              | 240              |
| **Green Mean**   | 172.121057971383 | 133.920176933271 | 187.176623490346 |
| **Green Standard Deviation** | 33.367212589639  | 26.3825052735597 | 34.279556612662 |
| **Green Median** | 179              | 139              | 191              |
| **Green Total Count** | 353847          | 290505           | 433957           |
| **Blue Min**     | 0                | 0                | 0                |
| **Blue Max**     | 174              | 161              | 228              |
| **Blue Mean**    | 137.44035133829  | 115.89930982255  | 168.267669377381 |
| **Blue Standard Deviation** | 27.30230083675   | 22.9942230296481 | 31.5655115612477 |
| **Blue Median**  | 142              | 120              | 171              |
| **Blue Total Count** | 353847          | 290505           | 433957           |
| **Saturation Min** | 0                | 0                | 0                |
| **Saturation Max** | 0.85098804401039124 | 0.490196079015732 | 0.590187013149261 |
| **Saturation Mean** | 0.533848226070404 | 0.31380999082874 | 0.138767182828996 |
| **Saturation Standard Deviation** | 0.123165272176266 | 0.0625388398766518 | 0.138767182828996 |
A False Positive Decision on the Patient Skin Based on the Statistical Parameters and Visual Quality Measures of Skin Images after Applying Morphological Filters

Among all quantitatively measured statistical parameters, the values of the medians of red, green and blue color components are shown in Fig. 7.

| Color Medians | Image 1 | Image 2 | Image 3 |
|---------------|---------|---------|---------|
| Red Median    | 223     | 186     | 234     |
| Green Median  | 179     | 139     | 191     |
| Blue Median   | 142     | 120     | 171     |

Fig. 7: Color medians of all nine filtered skin images

A total contextual analysis of assessing ‘Human Visual Quantization Threshold (HVQT)’ based visual quality measure is introduced in the following area.

B. Visual Quality Measures

Table II: Filtered Image 1 - Visual Quality Measures

| Threshold | Counter | Image Size | Visual Quality | Entropy | Entropy-Visual Quality | ToT | HVQT |
|-----------|---------|------------|----------------|---------|------------------------|-----|------|
| 0         | 0       | 39867      | 0              | 100     | 100                    | 100 | 100  |
| 1         | 0727    | 39967      | 1.903104       | 98.0698 | 98.1075                | 100 | 100  |
| 2         | 9749    | 39867      | 1.997322       | 98.0698 | 98.1075                | 100 | 100  |
| 3         | 7685    | 39867      | 2.49734        | 97.8573 | 97.8913                | 100 | 100  |
| 4         | 12999   | 39867      | 3.82634        | 96.7716 | 96.7609                | 100 | 100  |
| 5         | 27732   | 39867      | 7.88416        | 92.7338 | 92.7338                | 100 | 100  |
| 6         | 52963   | 39867      | 14.85307       | 85.5249 | 85.5249                | 100 | 100  |
| 7         | 85454   | 39867      | 24.44999       | 75.1501 | 75.1501                | 100 | 100  |
| 8         | 123866  | 39867      | 24.4963        | 85.2335 | 85.2335                | 100 | 100  |
| 9         | 178488  | 39867      | 44.7996        | 75.1301 | 75.1301                | 100 | 100  |
| 10        | 215240  | 39867      | 54.8287        | 68.6735 | 68.6735                | 100 | 100  |

Fig. 8: Graph connecting thresholds and visual quality values for filtered image 1

Table III: Filtered Image 2 - Visual Quality Measures

| Threshold | Counter | Image Size | Visual Quality | Entropy | Entropy-Visual Quality | ToT | HVQT |
|-----------|---------|------------|----------------|---------|------------------------|-----|------|
| 0         | 0       | 439857     | 0              | 100     | 100                    | 100 | 100  |
| 1         | 7863    | 439857     | 1.707669       | 98.2543 | 98.2543                | 100 | 100  |
| 2         | 7417    | 439857     | 1.709156       | 98.2500 | 98.2500                | 100 | 100  |
| 3         | 7724    | 439857     | 1.7799         | 98.2201 | 98.2201                | 100 | 100  |
| 4         | 9703    | 439857     | 2.429532       | 97.7524 | 97.7524                | 100 | 100  |
| 5         | 10250   | 439857     | 2.740002       | 95.9886 | 95.9886                | 100 | 100  |
| 6         | 30217   | 439857     | 6.14606        | 92.2394 | 92.2394                | 100 | 100  |
| 7         | 48976   | 439857     | 11.26237       | 87.7153 | 87.7153                | 100 | 100  |
| 8         | 7466    | 439857     | 16.20664       | 85.7135 | 85.7135                | 100 | 100  |
| 9         | 100234  | 439857     | 21.11942       | 70.3915 | 70.3915                | 100 | 100  |
| 10        | 127877  | 439857     | 29.46767       | 70.5293 | 70.5293                | 100 | 100  |

Fig. 9: Graph connecting thresholds and visual quality values for filtered image 2

Table IV: Filtered Image 3 - Visual Quality Measures

| Threshold | Counter | Image Size | Visual Quality | Entropy | Entropy-Visual Quality | ToT | HVQT |
|-----------|---------|------------|----------------|---------|------------------------|-----|------|
| 0         | 0       | 439857     | 0              | 100     | 100                    | 100 | 100  |
| 1         | 7482    | 439857     | 1.709156       | 98.2500 | 98.2500                | 100 | 100  |
| 2         | 7417    | 439857     | 1.709156       | 98.2500 | 98.2500                | 100 | 100  |
| 3         | 7724    | 439857     | 1.7799         | 98.2201 | 98.2201                | 100 | 100  |
| 4         | 9703    | 439857     | 2.429532       | 97.7524 | 97.7524                | 100 | 100  |
| 5         | 10250   | 439857     | 2.740002       | 95.9886 | 95.9886                | 100 | 100  |
| 6         | 30217   | 439857     | 6.14606        | 92.2394 | 92.2394                | 100 | 100  |
| 7         | 48976   | 439857     | 11.26237       | 87.7153 | 87.7153                | 100 | 100  |
| 8         | 7466    | 439857     | 16.20664       | 85.7135 | 85.7135                | 100 | 100  |
| 9         | 100234  | 439857     | 21.11942       | 70.3915 | 70.3915                | 100 | 100  |
| 10        | 127877  | 439857     | 29.46767       | 70.5293 | 70.5293                | 100 | 100  |

Fig. 10: Graph connecting thresholds and visual quality values for filtered image 3
Table III, IV shows the values of ToT, HVQT and HVQT-ToT. Fig. 11 shows a graph connecting visual quality measures (ToT& HVQT) and all nine filtered skin images.

Table V: All three Morphological Filtered Images - Visual Quality Measures

| Visual Quality Measures | Filtered Image 1 | Filtered Image 2 | Filtered Image 3 |
|-------------------------|-----------------|-----------------|-----------------|
| ToT                     | 10              | 5               | 13              |
| HVQT                    | 14              | 7               | 22              |
| HVQT-ToT                | 4               | 2               | 9               |

Fig. 11: Graph connecting ToT & HVQT measures and all three filtered images

It isn’t hard to recognize any indication for skin carcinoma in all the three experiment separated pictures. Texturization and morphological sifting were applied to the first test pictures and coming about separated pictures inspected for any conceivable side effect of skin carcinoma. The inquiry that emerges here is that whether it is conceivable to utilize the morphological separating procedure to demonstrate instances of 'bogus positive' and 'bogus negative' choices. One such instance of 'bogus positive' choice is examined for the Contextual analysis 2.

III. CONTEXTUAL ANALYSIS – 2

A. False Positive Decision

A patient’s both ways legs were influenced by some sort of organism and it was expressed that the patient has skin carcinoma in the legs. Figs. 13.1 and 13.2 separately show the captured pictures of both left and right legs. An iPhone 6 Plus portable camera was utilized for catching these pictures.

Fig. 13.1: Real time skin image and its equalized version of a patient’s left leg

These pictures were morphologically separated and inspected for the presence of skin carcinoma. The outcome ended up being negative, which means the assessment shaped on this patient is a 'bogus positive' choice. Test subtleties are given beneath.

Fig. 13.2: Real time skin image and its equalized version of a patient’s right leg

B. Left and Right Leg Skin Images - Statistical Parameters
Table VI: Original images of both legs - Statistical parametric values

|                          | Original left leg skin image | Original right leg skin image |
|--------------------------|-----------------------------|-------------------------------|
| Pixels Count             | 7990272                     | 7990272                       |
| Pixels without black     | 7990272                     | 7990272                       |
| Red Min                  | 17                          | 26                            |
| Red Max                  | 255                         | 251                           |
| Red Mean                 | 140.007143060962            | 131.830645064398              |
| Red Standard Deviation   | 28.9024388494293            | 34.2618454425707             |
| Red Median               | 139                         | Red Median 131                |
| Red Total Count          | 7990272                     | 7990272                       |
| Green Min                | 12                          | 0                             |
| Green Max                | 255                         | 255                           |
| Green Mean               | 129.805218142563            | 121.786528418557              |
| Green Standard Deviation | 29.1945947452379            | 36.1137012924896              |
| Green Median             | 129                         | Green Median 119              |
| Green Total Count        | 7990272                     | 7990272                       |
| Blue Min                 | 6                           | 6                             |
| Blue Max                 | 255                         | 255                           |
| Blue Mean                | 117.428137990797            | 109.919906356129              |
| Blue Standard Deviation  | 29.5189872885853            | 35.4181565431821             |
| Blue Median              | 116                         | Blue Median 105               |
| Blue Total Count         | 7990272                     | 7990272                       |
| Saturation Min           | 0                           | Saturation Min 0              |
| Saturation Max           | 1                           | Saturation Max 1              |
| Saturation Mean          | 0.11381649971083            | 0.120859831571579             |
| Saturation Standard Deviation | 0.0956049412488937          | 0.0799953788518906           |
Table VII shows the statistical parametric values of the morphological filtered images of both legs.

**Table VII: Statistical parametric values of the filtered images of both legs**

|                     | Morphological filtered left leg skin image | Morphological filtered right leg skin image |
|---------------------|-------------------------------------------|--------------------------------------------|
| Pixels Count        | 7990272                                   | 7990272                                    |
| Pixels without black| 7918620                                   | 7990272                                    |
| Red Min             | 0                                         | 0                                          |
| Red Max             | 255                                       | 251                                       |
| Red Mean            | 136.462064745731                          | 131.830645064398                          |
| Red Standard Deviation| 30.703175100044                  | 34.2618454425707                          |
| Red Median          | 136                                       | 131                                       |
| Red Total Count     | 7990272                                   | 7990272                                    |
| Green Min           | 0                                         | 0                                          |
| Green Max           | 255                                       | 255                                       |
| Green Mean          | 126.536860947913                          | 121.786528418557                          |
| Green Standard Deviation| 30.389904894508              | 36.1137012924896                          |
| Green Median        | 126                                       | 119                                       |
| Green Total Count   | 7990272                                   | 7990272                                    |
| Blue Min            | 0                                         | 6                                          |
| Blue Max            | 255                                       | 255                                       |
| Blue Mean           | 114.513385401648                          | 109.91996356129                           |
| Blue Standard Deviation| 30.244266515124                  | 35.418156541821                           |
| Blue Median         | 114                                       | 105                                       |
| Blue Total Count    | 7990272                                   | 7990272                                    |
| Saturation Min      | 0                                         | 0                                          |
| Saturation Max      | 1                                         | 1                                          |
| Saturation Mean     | 0.106276154518127                        | 0.120859831571579                        |
| Saturation Standard Deviation| 0.0696222558617592              | 0.0799953788518906                        |

Visual quality measures of ‘Human Visual Quantization Threshold (HVQT)’ based visual quality measure is presented in the next section.

C. Visual Quality Measures
A False Positive Decision on the Patient Skin Based on the Statistical Parameters and Visual Quality Measures of Skin Images after Applying Morphological Filters

Table VIII: Original Left Leg Image - Visual Quality Measures

| Threshold | Counter | Image Size | Visual Quality | Entropy | [Entropy-Visual Quality] | ToF | EVQT |
|-----------|---------|------------|----------------|---------|--------------------------|-----|-----|---|
| 0         | 0       | 1999272    | 0              | 100     | 100                      |     |     |   |
| 1         | 1999272 | 0.22319    | 99.8781        | 99.1462 |                         |     |     |   |
| 2         | 1999272 | 0.308593   | 96.7373        | 99.4774 |                         |     |     |   |
| 3         | 1999272 | 0.560958   | 95.4308        | 93.8016 |                         |     |     |   |
| 4         | 1999272 | 1.57738    | 91.4523        | 94.8848 |                         |     |     |   |
| 5         | 1999272 | 2.099948   | 92.1689        | 92.3412 |                         |     |     |   |
| 6         | 1999272 | 7.999293   | 95.2899        | 94.3225 |                         |     |     |   |
| 7         | 1500385 | 15.70707   | 88.6949        | 73.3596 |                         |     |     |   |
| 8         | 1999272 | 10.22141   | 95.9169        | 93.8898 |                         |     |     |   |
| 9         | 1999272 | 27.33337   | 71.6614        | 45.1329 |                         |     |     |   |
| 10        | 2176308 | 34.82761   | 61.5429        | 36.6598 |                         |     |     |   |
| 11        | 3945199 | 43.82873   | 38.1273        | 16.6943 |                         |     |     |   |
| 12        | 3875590 | 48.69851   | 51.9045        | 3.02902 |                         |     |     |   |
| 13        | 4683869 | 54.62503   | 41.3669        | 9.270022|                         |     |     |   |
| 14        | 4813240 | 60.31733   | 59.6023        | 30.42744|                         |     |     |   |
| 15        | 5207148 | 65.1869    | 34.8303        | 20.3389 |                         |     |     |   |

Fig. 14: Graph of thresholds and visual quality values for original left leg image

Table IX: Filtered Left Leg Image - Visual Quality Measures

| Threshold | Counter | Image Size | Visual Quality | Entropy | [Entropy-Visual Quality] | ToF | EVQT |
|-----------|---------|------------|----------------|---------|--------------------------|-----|-----|---|
| 0         | 0       | 1999272    | 0              | 100     | 100                      |     |     |   |
| 1         | 0       | 1999272    | 0.22319        | 99.8781 | 99.1462                  |     |     |   |
| 2         | 0       | 1999272    | 0.308593       | 96.7373 | 99.4774                  |     |     |   |
| 3         | 0       | 1999272    | 0.560958       | 95.4308 | 93.8016                  |     |     |   |
| 4         | 0       | 1999272    | 1.57738        | 91.4523 | 94.8848                  |     |     |   |
| 5         | 0       | 1999272    | 2.099948       | 92.1689 | 92.3412                  |     |     |   |
| 6         | 0       | 1999272    | 7.999293       | 95.2899 | 94.3225                  |     |     |   |
| 7         | 0       | 1500385    | 15.70707       | 88.6949 | 73.3596                  |     |     |   |
| 8         | 0       | 1999272    | 10.22141       | 95.9169 | 93.8898                  |     |     |   |
| 9         | 0       | 1999272    | 27.33337       | 71.6614 | 45.1329                  |     |     |   |
| 10        | 0       | 2176308    | 34.82761       | 61.5429 | 36.6598                  |     |     |   |
| 11        | 0       | 3945199    | 43.82873       | 38.1273 | 16.6943                  |     |     |   |
| 12        | 0       | 3875590    | 48.69851       | 51.9045 | 3.02902                  |     |     |   |
| 13        | 0       | 4683869    | 54.62503       | 41.3669 | 9.270022                 |     |     |   |
| 14        | 0       | 4813240    | 60.31733       | 59.6023 | 30.42744                 |     |     |   |
| 15        | 0       | 5207148    | 65.1869        | 34.8303 | 20.3389                  |     |     |   |

Fig. 15: Graph of thresholds and visual quality values for filtered left leg image

Table X: Original Right Leg Image - Visual Quality Measures

| Threshold | Counter | Image Size | Visual Quality | Entropy | [Entropy-Visual Quality] | ToF | EVQT |
|-----------|---------|------------|----------------|---------|--------------------------|-----|-----|---|
| 0         | 0       | 1999272    | 0              | 100     | 100                      |     |     |   |
| 1         | 0       | 1999272    | 0.271392       | 99.1201 | 99.4276                  |     |     |   |
| 2         | 0       | 1999272    | 0.974322       | 99.0238 | 98.3136                  |     |     |   |
| 3         | 0       | 1999272    | 1.813416       | 97.1865 | 94.3730                  |     |     |   |
| 4         | 0       | 1999272    | 6.15963        | 89.6462 | 87.3683                  |     |     |   |
| 5         | 0       | 1999272    | 11.65257       | 88.1643 | 76.7536                  |     |     |   |
| 6         | 0       | 1999272    | 13.34894       | 84.8364 | 62.3263                  |     |     |   |
| 7         | 0       | 1999272    | 15.96379       | 88.5934 | 72.3740                  |     |     |   |
| 8         | 0       | 1999272    | 31.18366       | 81.1347 | 68.2978                  |     |     |   |
| 9         | 0       | 1999272    | 40.14877       | 70.5329 | 61.2528                  |     |     |   |
| 10        | 0       | 1999272    | 59.49344       | 41.3896 | 32.8267                  |     |     |   |
| 11        | 0       | 1999272    | 52.82733       | 47.3375 | 32.8267                  |     |     |   |
| 12        | 0       | 1999272    | 52.82733       | 47.3375 | 32.8267                  |     |     |   |
| 13        | 0       | 1999272    | 52.82733       | 47.3375 | 32.8267                  |     |     |   |
| 14        | 0       | 1999272    | 52.82733       | 47.3375 | 32.8267                  |     |     |   |

Fig. 16: Graph of thresholds and visual quality values for original right leg image
Table XI: Filtered Right Leg Image - Visual Quality Measures

| Visual Quality Measures | Original Left Leg Image | Filtered Left Leg Image | Original Right Leg Image | Filtered Right Leg Image |
|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|
| ToT                     | 12                      | 11                      | 10                       | 11                       |
| HVQT                   | 18                      | 18                      | 16                       | 16                       |
| HVQT-ToT              | 6                       | 7                       | 6                        | 5                        |

Fig. 17: Graph of thresholds and visual quality values for filtered right leg image

IV. RESULTS AND OBSERVATIONS

Table X shows the values of ToT, HVQT and HVQT-ToT. Fig. 17 shows a graph connecting visual quality measures (ToT & HVQT) and both the original and the filtered skin images.

Table XII: All Three Morphological Filtered Images - Visual Quality Measures

| Visual Quality Measures | Left leg original image | Filtered left leg image | Right leg original image | Filtered right leg image |
|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|
| ToT                     | 12                      | 11                      | 10                       | 11                       |
| HVQT                   | 18                      | 18                      | 16                       | 16                       |
| HVQT-ToT              | 6                       | 7                       | 6                        | 5                        |

Fig. 18: Graph connecting visual quality measures and leg skin images

Since the HVQT-ToT esteems remain nearly the equivalent (5, 6 and 7), the leg skin pictures don't represent any danger of skin carcinoma. Along these lines, the choice made on this present patient's skin status is seen here as FALSE.

V. CONCLUSION

1. All skin pictures are practically white adjusted since factual parametric qualities continue as before for the instances of typical and WB shading portrayals.
2. Skin picture 3 shows plausibility of skin carcinoma among every one of the three sided pictures.
3. Skin picture 2 is the best match of each of the three separated pictures.
4. Reviewing of skin quality should be possible dependent on the estimations of (HVQT – ToT)
5. Both the skin pictures of left and right legs are practically white adjusted since measurable parametric qualities remain nearly the equivalent for the instances of ordinary and WB shading portrayals.
6. Both skin pictures show probability of organism development and not skin carcinoma.
7. Evaluating of skin quality should be possible dependent on the estimations of (HVQT – ToT)

REFERENCES

1. Dana, K. J., van Ginneken, B., Nayar, S. K., and Koenderink, J. J., 1999, “Reflectance and texture of real world surfaces”, ACM Transactions on Graphics 18(1), 1–34
2. DeCarlo, D., Metaxas, D., and Stone, M., 1998, “An anthropometric face model using variational techniques”, 27 Proceedings of SIGGRAPH 67–74
3. Dong, J. and Chantler, M., 2002, “Capture and synthesis of 3D surface texture”, Proceedings of Texture 2002 - The 2nd international workshop on texture analysis and synthesis 41–46
4. Guenter, B., Grimm, C.,Wood, D., Malvar, H., and Pighin, F., 1998, “Making faces”, Proceedings of SIGGRAPH 55–66
5. Ishii, T., Yasuda, T., Yokoi, S., and Toriwaki, J., 1993, “A generation model for human skin texture”, Communicating with Virtual Worlds , pp. 139–150
6. Jain, A., Prabhakar, S., and Hong, L., 1999, “A multichannel approach to fingerprint classification”, IEEE Transactions on Pattern Analysis and Machine Intelligence 21(4), 348–369
7. Julesz, B., 1981, “Textons, the elements of texture perception and their interactions”, Nature (290), 91–97 Koenderink, J. J. and van Doorn, A. J., 1996, “Illuminance texture due to surface mesostructure”, Journal of the Optical Society of America A 13(3), 452–63
8. Koenderink, J. J., van Doorn, A. J., Dana, K. J., and Nayar, S. K., 1999, “Bidirectional reflection distribution function of thoroughly pitted surfaces”, International Journal of Computer Vision 31(2-3), pp. 129–144
9. Lee, Y., Terzopoulos, D., and Walters, K., 1995, “Realistic modeling for facial animation”, Proceedings of SIGGRAPH 55–62
10. Leung, T. and Malik, J., 1999, “Recognizing surfaces using three-dimensional textons”, International Conference on Computer Vision 2, 1010–1017
11. Leung, T. and Malik, J., 2001, “Representing and recognizing the visual appearance of materials using three dimensional textons”, International Journal of Computer Vision 43(1), 29–44
12. Liu, X., Yu, Y., and Shum, H., 2001, “Synthesizing bidirectional texture functions for real-world surfaces”, Proceedings of SIGGRAPH 97–106
13. Ma, W. Y. and Manjunath, B. S., 1996, “Texture features and learning similarity”, Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition 425–430
14. McGunnigle, G. and Chantler, M. J., 2000, “Rough surface classification using first order statistics from photometric stereo”, Pattern Recognition Letters 21, 593–604
15. Murase, H. and Nayar, S. K., 1995, “Visual learning and recognition of 3-D objects from appearance”, International Journal of Computer Vision 5–24
A False Positive Decision on the Patient Skin Based on the Statistical Parameters and Visual Quality Measures of Skin Images after Applying Morphological Filters

16. Nahas, M., Huitric, H., Rioux, M., and Domey, J., 1990, “Facial image synthesis using skin texture recording”, Visual Computer 6(6), pp. 337–43.

17. Penirschke, A., Chantler, M., and Petrou, M., 2002, “Illuminant rotation invariant classification of 3D surface 28 textures using Lissajous’s ellipses”, Proceedings of Texture 2002 - The 2nd international workshop on texture analysis and synthesis, pp. 103–108.

18. Pont, S. C. and Koenderink, J. J., 2002, “Bidirectional texture contrast function”, Proceedings of the European Conference on Computer Vision 2353(IV), pp. 808–822.

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