GDV images: Current research and results

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Abstract

We use statistical analysis and machine learning to interpret the GDV coronas of fruits and human's fingers in order to verify two hypotheses: (A) the GDV images contain useful information about the object/patient and (B) the human bioelectromagnetic field can be influenced by some outside factors. We performed several independent studies, three of which we here briefly describe: (a) recording coronas of berries of different grapevines, (b) detecting the influence of drinking the tap water from ordinary glass and energetic glass K2000, and (c) detecting the influence of natural energy source in Tunjice near Kamnik, Slovenia on the human bioelectromagnetic field. All three studies, as well as some other studies described elsewhere, gave significant results and therefore support both hypotheses.

1 Introduction

We use machine learning and statistical analysis in order to interpret the GDV (Gas Discharge Visualization) images, also called coronas. We record the GDV images by a device based on the Kirlian effect (Korotkov, 1998). For the purpose of analysis the GDV images are described with a set of numeric parameters - attributes (see Section 3). We want to verify three hypotheses: (A) the GDV images contain useful information about the object/person, (B) the human bioelectromagnetic field (BEM) can be influenced by some outside factors, and (C) the map of organs on coronas of human fingertips (Korotkov, 1998) makes sense.

In the past we already performed several independent studies (Kononenko et al., 1999): recording coronas of apple skin, relating the coronas of female fingers with the state of menstrual cycle, detecting of the influence of different T-shirts on the human BEM, studying effects of the art of living programme on the BEM of its participants (Trampuž et al., 1999), and, more recently, relating the coronas of human fingertips with the energetic diagnosis provided by the extrasense healer (Bevk et al., 2000), and studying the influence of mobile telephones on the human BEM (Bosnić et al., 2000). All the studies support hypotheses A and B, and two studies, the one about menstrual cycle and the one with the extrasense healer, support also hypothesis C.

Three studies, described in this paper (in the three following sections), are aimed to further verify hypotheses A and B: (a) recording coronas of berries of different grapevines, (b) detecting the influence of drinking the tap water from ordinary glass and energetic glass K2000, and (c) detecting the influence of a natural energy source in Tunjice near Kamnik, Slovenia on the human BEM.

2 Recording coronas of grapevine berries

The aim of the study was to determine, whether Kirlian camera can record any useful information by recording coronas of berries. We used nine sorts of grapevines, two reedvines for each sort (healthy and infected by different viruses), obtained from plants of Biotechnical Faculty in Ljubljana. We recorded 20 berries for each reedvine. We used only 14 basic numeric attributes (see Section 3, the absolute area of corona was excluded due to different sizes of berries of different sorts).

We used two machine learning algorithms in order to distinguish different sorts and infected from noninfected reedvines from numerical description of coronas of their berries. The naive Bayesian classifier assumes the conditional independence of attributes given the class and calculates for each new instance the probability of each class (Kononenko, 1993). Assistant-R builds decision trees and uses a non-myopic algorithm ReliefF for the estimation of the quality of attributes (Kononenko et al., 1997). We measured the classification accuracy and the information score (Kononenko and Bratko, 1991). The latter

Table 1: Results of two machine learning algorithms in different classification problems for grapevine data.

	Naive Bayes		Assistant-R	
	accuracy (%)	inf. score (bit)	accuracy (%)	inf. score (bit)
infected pinela	66.1 ± 10.0	0.29 ± 0.12	62.8± 10.8	0.19± 0.09
infected malvazija	87.5 ± 10.6	0.66 ± 0.14	81.7 ± 11.7	0.53 ± 0.17
all 9 vines	39.1 ± 4.3	1.23 ± 0.08	36.6 ± 4.1	0.93 ± 0.09
GLRa virus	79.2 ± 7.4	0.51 ± 0.09	76.9 ± 7.6	0.46 ± 0.09
volovnik:zweigeld	87.5 ± 7.6	0.68 ± 0.12	90.4 ± 8.8	0.72 ± 0.17

measure eliminates the influence of prior probabilities and appropriately treats probabilistic answers of the classifier.

We tried to solve various problems: (a) distinguishing infected 'Pinela' from noninfected 'Pinela', 2 classes, 30 examples in each class; (b) distinguishing 'Malvazija' without symptoms and 'Malvazija' with symptoms of phytoplasma; 2 classes, 20 examples in each class; (c) distinguishing all nine sorts of grapevines, 40 examples in each class; (d) Volovnik'+'Zweigeld' (not infected with GLRaV viruses) and 'Sladkočrn'+ 'Klarnica' (infected with GLRaV viruses); 2 classes, 80 examples in each class; (e) distinguishing two cultivars: 'Volovnik' and 'Zweigeld', 2 classes, 40 examples in each class. For each problem we randomly split the set of all examples in 70% for training and 30% for testing. This process was repeated 10 times and average results and standard deviations are presented in Table 1.

In all tests, the classification accuracy is significantly higher than the prior probability of the classification. For example, in the case of all nine cultivars, the classification accuracy is 35.7%. Since all nine classes are of the same size, a prior probability for each class is 1/9=11.1%, which is more than three times lower than the classification accuracy. Because of this, the information score is very high. The classification is quite successful also in the cases of classification of grape berries according to their sanitary status. In these cases, the prior probability is 50% while the classification accuracy ranges between 70% and 88.3% which is indeed unexpectedly high.

3 Drinking water from ordinary and 'energetic' glass K2000

We performed an experiment with drinking water from ordinary glass and so called 'energetic' glass K2000, which is somehow coded with positive information/energy. K2000 was invented by Vili Poznik from Celje, Slovenia. He uses orgon technology (methodology) in order to encode information into glass.

We recorded each of 34 volunteers three times in three days: without drinking water, 15 minutes after drinking water from ordinary glass, and 15 minutes after drinking water from energetic glass K2000. The persons didn't know which glass is ordinary and which is energetic. We used tap water and the water was left 15 minutes in the glass before it was consumed. For each person we recorded coronas of all ten fingertips. We calculated 15 basic parameters for coronas of each finger and we averaged their values over all ten fingers. We used the following parameters:

1.. Absolute area of corona.

2.. Noise, deleted from the picture (depends on the first setting in the program).

3.. Form coefficient $K = L^2/2\pi S$.

4.. Fractal dimension.

5, 6.. Brightness coefficient and deviation.

7.. Number of separated fragments in the image.

8, 9.. Average area of fragments and its deviation.

10.. Relative area of corona $K_{II} = (S_{image} + S_{oval})/S_{oval}$.

11.. Relative coefficient of glow inside the inner oval.

12-15.. Relative coefficient of image glow for 25, 50, 75 nad 100% area (from the whole area)

We calculated average values and standard deviations for each parameter and for each glass: the difference between the value after drinking water from the given glass minus the value before drinking the water (see Table 2). The results indicate that water from K2000 increases the coronas (parameters 1, 8 and

Table 2: Statistical analysis for drinking water from two glasses

param.	average		st.dev.					
	ordinary	k2000	ordinary	k2000	diff.	st.dev.	t	significance
1	-177,89	678,71	1585,52	1901,33	856,61	1199,00	4,17	>0,99994
2	-436,53	-151,93	929,56	717,03	284,60	614,84	2,70	0,9931
3	-18,56	-3,55	63,58	58,65	15,02	42,27	2,07	>0,959
4	-0,28	-0,13	0,75	0,71	0,14	0,48	1,76	0,9216
5	-2,73	-2,11	4,08	5,31	0,61	4,36	0,82	0,5878
6	0,14	-0,54	4,77	4,67	-0,67	4,34	-0,90	0,6319
7	-1,61	-3,10	7,20	8,14	-1,49	4,74	-1,83	0,9328
8	-197,40	366,34	1279,57	1710,04	563,74	944,61	3,48	>0,99933
9	-4,94	8,14	57,09	56,50	13,08	44,94	1,70	0,9109
10	-0,06	0,15	0,39	0,48	0,21	0,35	3,45	>0,99933
11	-0,01	0,01	0,03	0,04	0,02	0,03	3,49	>0,99933
12	0,04	0,12	0,16	0,22	0,08	0,14	3,46	>0,99933
13	0,03	0,12	0,18	0,22	0,09	0,15	3,55	>0,99953
14	0,03	0,10	0,18	0,21	0,07	0,14	3,11	>0,99806
15	0,00	0,02	0,05	0,07	0,03	0,05	2,82	>0,9949

Table 3: Statistical analysis for natural energy source in Tunjice

parameter	difference	st.dev.	t
1	-1734,8	4058,6	3,02
7	0,47	2,13	-1,56
8	-1254,8	3867,1	2,29
10	-0,299	1,172	1,80
CW	-0,628	9,605	2,86
%1	-0,0748	0,2762	1.91
%7	0,3110	0,2746	-8.01
%8	-0,0234	0,3045	0.54
%10	0,0578	0,2560	-1.59
%CW	-0,0774	0,2527	2,17

10-15) and decreases the fragmentation (parameter 7), while that from ordinary glass slightly decreases the coronas and, to the lower extend than K2000, decreases the fragmentation.

To evaluate the significance of differences between the glasses we used the paired one-tailed t-test. We calculated the differences and st. deviations between the values of parameters of two glasses. The values together with t-values and significance levels are given in Table 2. With the exception of parameter 7, parameters 1,8 and 10-15 show significant differences (significance level greater than 0.99)

For machine learning analysis we used C4.5 system for building decision trees (Quinlan, 1993). We wanted to distinguish ordinary glass from K2000. We had 68 examples and we performed two experiments: using all 15 attributes and using only attributes 1,7,8, and 10. The average classification accuracy, obtained by 10-fold cross validation, was 76.2%, when all atrtibutes were available, and 81.0%, with four selected attributes. In the latter case, most of the times the decision tree contained only attribute 8 (average area of fragments).

4 Natural energy source in Tunjice

In this study we wanted to evaluate the effect of the natural energy source in Tunjice near Kamnik, Slovenia on the human BEM. The coronas of all ten fingertips were recorded for 71 visitors of Natural Healing Garden Tunjice. Each visitor was recorded before and after the 45 minutes visit of the Healing Garden. Due to mistakes and noise in recordings we used for the analysis the coronas of only 50 persons. The coronas of each finger were described with 15 basic attributes (see Section 3) and for each person they were averaged over all ten fingers.

In this studz we used only parameters 1,7,8,10, which in previous studies proved to be important, and

we defined some additional parameters: corona width (CW), and procentual counterparts for parameters 1,7,8,10 and CW. We calculated average difference of values and standard deviations for each parameter: the difference between the value before visiting the Garden and after the visit. To evaluate the significance of differences we used the paired one-tailed t-test. The average values and standard deviations together with t-values are given in Table 3. Procentual counterpart of parameter i is indicated by $\%i$. All values of t absolutely greater than 2.01 indicate the significant change at the significance level $\alpha = 0.05$.

The results show that the number of fragments (parameter 7) is significantly decreased and that coronas are significantly thicker (parameter CW). Areas of coronas are almost significant (parameter 1).

5 Conclusions

The three studies described in this paper, as well as other studies performed in the past, show that the GDV records, described with a set of parameters, contain useful information and they are not only noise. The classification accuracy on different problems with grapevine data is significantly higher than if the classifier would be random. This means that coronas of grapevine berries contain useful information about cultivar and about their sanitary status. We used only parameters that were independent of the size of grape berries. However, there is a possibility to introduce new parameters that may contain additional useful information. We plan to verify this hypothesis and further improve the methodology in order to make it useful for classification of grape cultivars and their diseases.

The results of the second study show significant positive efect of drinking water from energetic glass K2000. Although, till now, there is no physical explanation for coding the information into glass, the effects are obviously measurable. In order to make the study more reliable, we plan to perform also a double-blind experiment with slightly modified scenario so that persons will be recorded several times: immediately before drinking and 15 and 30 minutes after drinking the water.

The result of the study in Tunjice indicates that the visit of the Natural Healing Garden positively influences the human BEM. Coronas are larger and less fragmented. In order to obtain more reliable conclusions we plan to record coronas of a control group of people, that shall visit another place (for example a walk in a forest) in the same manner as they visited the Healing Garden. The comparison should show whether the Healing Garden has greater influence than ordinary gardens.

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