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**INFORMATION TECHNOLOGIES OF SIGNAL PROCESSING AND NOVEL
FEATURE'S SELECTION IN MEDICAL APPLICATION**

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Proposed lecture consist of three parts:

Part 1. Our understanding of Information Technologies of signal processing (ITSP).

In this part we consider the problem of building ITSP using special computer system **SIDIGRAPH** (**S**ignal+**D**ialog+**G**RAPHics) which contains a wide set of traditional and original computation algorithms for treatment, analysis and interpretation of real data and also special graphics tools and modern data base for storing the results of treatments.

Part 2. The theoretical results of a features selection's problem.

In this part we consider this problem in statistical formulation and show some interesting and important results including

- * when and why relevant feature in the sense of known definition may be useless;
- * why changing of Shannon entropy can be regarded only as necessary but not sufficient condition that feature is useful;
- * when combination of separately crossing features allows to recognize of classes without error.

Part 3. Modern Informative Technologies for medical application

In this part we consider the problem of construction of computer's systems for diagnostics of a heard-vascular system as a great importance problem for all day medicine.

To increase of reliability and sensitivity of ECG's data analysis the novel method based on representation of ECG data in phase space we have developed. The main idea of this method is based on special transformation of a scalar time signal from any 12 traditional leads to corresponding 2-dimension graphic structures. Such transformation allows us to construct additional diagnostic features for determination of heart pathologies and to increase a sensitivity of ECG analysis in rest and after load.

To solve the problem of diagnostic feature selection we had constructed the informative technology for entering and treatment of real-time ECG's records with database for storing the results of this treatment. We had studied this system on tree group of persons: **HEALTHY** person, **PATIENT 1** with confirmed pathology of cardiovascular system and normal results of the blood test and **PATIENT 2** having heart inflammatory disturbance because of infection which confirmed according to the results of the blood test.

The clinical trials (Ukrainian Institute of Cardiology, Kiev,1998-1999) have confirmed that combination of novel ECG's features in the phase space allows to recognise of memberships from considered groups (Healthy, Patient 1 and Patient 2) by using of special discriminant functions including variance of phase trajectories, so-

called factors of a symmetry of some fragments of this trajectories and also relative angles of orientation of averaged phase trajectories from some leads.

It is interesting that we had studied suggested method in most difficult cases when all ECG's records was recognised by known Hanover algorithm as normal for all testing person from above mentioned tree groups. The results obtained during clinical trials are given on following table.

Observations	Result of classification			
	Percent of errors	Healthy	Patient 1	Patient 2
Healthy (20 ECG)	5 %	19	0	1
Patient 1 (5 ECG)	0 %	0	5	0
Patient 2 (19 ECG)	0 %	0	0	19
Total (44 ECG)	2.3 %	19	5	20