The International Conference on Trends and Perspectives in Linear Statistical Inference (LinStat2014), 24-28 August, 2014,

Linköping, Sweden

"FRACTAL AND ANTIFRACTAL OXYMORONS, MOEBIUS STRIP LIKE TRANSFORMATIONS OF BIOMEDICAL DATA AS BASIS FOR EXPLORATORY SUBGROUP ANALYSIS "

S.K. Kulishov, O.M. Iakovenko

HSEIU "Ukrainian Medical Stomatological Academy", Poltava, Ukraine, V.P. Komissarenko Institute of Endocrinology and Metabolism AMS Ukraine, Kyiv, Ukraine

1. Prerequisites of fractal and antifractal oxymoron, Moebius strip like data transformation for exploratory analysis

Subgroup analyses involve splitting all the participant data into subgroups, often so as to make comparisons between them. Subgroup analyses may be done for subsets of participants, or for subsets of studies. Subgroup analyses may be done as a means of investigating heterogeneous results, or to answer specific questions about particular patient groups, types of intervention or types of study.

- It’s known the case-based approach for characterizing and analyzing subgroup patterns as techniques for retrieving characteristic factors and cases, and merge these into prototypical cases for presentation to the user [1]. This method give possibilities present an alternative view on the subgroup pattern, and enable a convenient retrieval of interesting (meta-) information associated with the subgroup objects [1].
- It’s known the Moebius like space orientation of depolarization processes were characterized by the change of supraventricular pacemaker and ectopic activity onto the ventricular one [2]. In the patients with sick sinus syndrome, the Moebius like arrhythmias were displayed as a combination of supraventricular and ventricular extrasystoles, pair fibrillation and flutter transformation from atria to ventricles [2]. The patients with complete atrioventricular block showed the Moebius like changes of depolarization/repolarization geometry as the alternation of proximal and distal ventricular rhythms [2].

- The specifics of the geometry of depolarization and repolarization processes in the patients with full atrioventricular block and binodal disease can be considered in elaborating differential treatment programs to be used in microcomputers for implantable cardiac pacemakers [2]. Analysis of the cardiac depolarization/repolarization geometry may serve as additional criteria for sudden death prognosis [2].
- Anxiety and depression can be a manifestation similar to the Moebius strip [3]. Anxiety is an integral and essential part of depression [4]. Moreover, anxiety symptoms should be considered a significant predictor of depression severity and the level of a patient's functional recovery, and can be utilized in choosing a treatment intervention [4].
- Our purpose was to change subgroup analysis to determine "re-entry" mechanisms of chronic aging-dependent diseases; turning pathogenetic, sanogenetic processes by using Moebius strip, fractal and antifractal oxymoron like transformations.

2. The methodologies of fractal and antifractal oxymoron, Moebius strip like exploratory subgroup analysis

- We used fractal exploratory statistical analysis and system, and antisystem comparison of clinical and pharmacological data [5,6], but this investigation is new step to determine "re-entry" mechanisms of chronic aging-dependent diseases.
- The methodologies of fractal and antifractal oxymoron, Moebius strip like exploratory analysis is reduced to:

- initialization of study objects with fractal and antifractal oxymoron, Moebius strip like data structure;
- formation of categorical variabilities that consist from informative numeric variabilities by iteration process as for receiving fractal and antifractal oxymoron sets, Moebius strip like data;
- statistical analysis of categorical variabilities and dependent numeric variabilities,
- determination of the variabilities distribution - parametric or nonparametric by single-factor the Kolmogorov-Smirnov test; Shapiro-Wilk W test and graphical methods: frequency distribution histograms stem & leaf plots; scatter plots; box & whisker plots; normal probability plots: PP and QQ plots; graphs with error bars (Graphs: Error Bar);

- transformations that may be normalize of non-normality data: If residuals have a right skew, should apply a square-, a cube- or fourth-root, a logarithmic, and an inverse transformation to data. If residuals have a left skew, should raise to the second, third or fourth power, an exponential transformation to data;
- ANOVA - Analysis of Variance, with variations depending on the linear nature of variability. Method of multiple comparison groups Tukey HSD, Scheffe, Bonferroni if deviations were homogeneous for the test Levene, and in the absence of homogeneity - the criteria Tamhane's T2, Games-Howell;
- nonparametric equivalent of ANOVA / MANOVA - Kruskal-Wallis test;
- Formulation of a conclusion based on statistical analysis.

Formation of subgroups may be the result of a double iteration ranked indicators on the principles of the square Cantor and his anti-square, "carpet" Sierpinski. This process is presented graphically (Fig. 1, 2, 3).

Fig. 1. Formation of subgroups may be the result of a double iteration ranked indicators on the principles of the square Cantor

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64

Formation of subgroups may be the result of a double iteration ranked indicators on the principles of the square Cantor and his anti-square, "carpet" Sierpinski. This process is presented graphically (Fig. 1, 2, 3).

Fig. 2. Formation of subgroups may be the result of a double iteration ranked indicators on the principles of the anti-square Cantor

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64

Formation of subgroups may be the result of a double iteration ranked indicators on the principles of the square Cantor and his anti-square, "carpet" Sierpinski. This process is presented graphically (Fig. 1, 2, 3).

Fig. 3. Formation of subgroups may be the result of a iteration ranked indicators on the principles of the "carpet" Sierpinski

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63
64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81

3. Some illustrations of using exploratory fractal and antifractal oxymoron, Moebius strip like exploratory subgroup analysis of biomedical data

Examples of the results of the algorithm for using principles of fractal and antifractal oxymoron, Moebius strip like Exploratory Data Analysis of clinical research data are presented by syndromes of the consumption of progradient and antigradient factors [7], including prooxidative and antioxidative [7], ischemic and antiischemic [7], reperfusive and antireperfusive [7], diagnosis of the viable, stunned, hibernation myocardium and cardiac protective precondition [7], proinflammatory and antiinflammatory [8,9,10,11], stress and stress-limited factors [9], myocardial electrical instability [8,12,13].

Determination of rhythms and fractals aging and anti-aging processes is reduced to diagnosis of the manifestations of age-dependent pathology [14]. Age-dependent pathology, as the expression of genes of aging, is presented by the symptoms, syndromes, diseases, multimorbidity states, more often the cardiovascular, respiratory, endocrine, digestive and nervous systems [14]. Triggers of the aging processes are the effects of anti-aging factors consumption [14]. Monitoring the activity of internal organs allows to evaluate the dynamics of these processes as episodes of small range of diurnal changes of the heart rate (chronotropic insufficiency); the appearance of heart rhythm and conduction disturbances, including as Moebius strip like; arterial hypertensive or hypotensive reactivity, increasing arterial pulse pressure; hypopnea or apnea during the night; syndrome "restless legs" at night; hypoglycemia, hyperglycemia; desynchronosis of cardiovascular, respiratory, glycemia, hormonal rhythms [14].

Conclusion:

Proposed and tested an algorithm of using fractal and antifractal oxymorons, Moebius strip like transformations of biomedical data for exploratory subgroup analysis. The algorithm is reduced to initialization of study objects with fractal and antifractal data, Moebius strip like structure; formation of categorical variabilities that consist from informative numeric variabilities as sum of prograd ient and antigradient data, including similar to "superior and inferior surfaces of strip", by iteration process as for receiving fractal and antifractal sets; statistical analysis of categorical variabilities and dependent numeric variabilities, using parametric and nonparametric methods; formulation of the conclusion.

Conclusion:

Our algorithm of using fractal and antifractal oxymorons, Moebius strip like transformations of biomedical data for exploratory analysis will help to uncover "re-entry" mechanisms of pathology, principles of prophylaxis and treatment chronic aging-dependent diseases.

References

1. Atzmueller M., Puppe F. Case-based characterization and analysis of subgroup patterns. Proc. LWA, 2006, KDML Special Track, Hildesheimer Informatik Berichte, University of Hildesheim, 2006.
2. Kulishov S. K., Vorobjov Ye. A, Vakulenko K. Ye., Savchenko A. G., Shevchenko T. I., Latokha I. A. Geometry of depolarization and repolarization processes in IHD patitents of varying age with complete atrioventricular block or binodal disease as precondition to individualized treatment "Problems of aging and longevity ", 2006, 15, № 4. - P. 332-338
3. Zohar J. Anxiety and depression: the Moebius strip "Medicographia", Servier publication, 2012, No 112, Vol. 34, No 3, P. 265-269.
4. S. Malyarov S. Does depression exist without anxiety? "Medicographia", Servier publication, 2012, No 112, Vol. 34, No 3, P. 324.
5. S.K.Kulishov, O.M.Iakovenko "Fractals as triggers exploratory statistical analysis of clinical pharmacological data", International journal of pharmacology and pharmaceutical technology (IJPPT), 2012, Volume 1, Issue 1, p. 53-57.
6. S.K. Kulishov, O.M. Iakovenko. "Solving clinical problems using system and antisystem comparison, graphic modeling", *Innovative Medicine and Biology, Canadian International Monthly Reviewed Journal (CIJIMB), ISSN 1925-2188;* 2011, No 3, pp. 30-42.
7. Bobrov V.A., Kulishov S.K. "The adaptive ischemic and reperfusion syndromes in the patients with ischemic heart disease: mechanisms, diagnosis, substantiation of therapy", Poltava: Dyvosvit, 2004, 240 p.
8. S. Kulishov., K. Vakulenko, I. Latoha "Myocardial electrical instability as the derivative of inflammation consumption of antiiflammatory factors syndrome, changes in geometry depolarization of atria, ventricles in the patients with coronary heart disease", *Absract book of "Rhythm 2011"*, Congress, Marseile, France, 2011, p. 39.
9. Kulishov S., Kudria I. "Stress and inflammation as determinative factors in the patients with coronary heart disease and essential hypertension", Final programme& Abstract Book of the European Conference, IInd edition "Heart, Vessels & Diabetes", 3-5 November, Athens, Greece, 2011, p. 50.
10. Kulishov S.K., Solomatina L.V. Inflammation consumption of anti-inflammatory factors syndrome as trigger of vascular pre-atherosclerotic remodeling in the patients with essential hypertension; Final programme& Abstract Book of the European Conference. 2nd edition "Heart, Vessels & Diabetes", 3-5 November, Athens – Greece. – 2011. – P. 50.
11. Kulishov S.K., PrikhodkoN.P.Ratio of pro-inflammatory and anti-inflammatory factors for acute coronary heart disease course // Supplement to Official Journal of the World Heart Federation "Global Heart" (World Congress of Cardiology Scientific Sessions, 2014, Incorporating the Annual Scientific Meeting of the Cardiac Society of Australia and New Zealand), 2014, March, Vol. 9, Issue 1S, e 282 (PW 109).
12. Kulishov S.K., VakulenkoK.Ye., O.M.Iakovenko Fractal and antifractal analysis of triggers and resonators in electrical instability in the patients with coronary heart disease and sinus node dysfunction // Supplement to Official Journal of the World Heart Federation "Global Heart" (World Congress of Cardiology Scientific Sessions, 2014, Incorporating the Annual Scientific Meeting of the Cardiac Society of Australia and New Zealand), 2014, March, Vol. 9, Issue 1S, e 169 (PT 022).
13. Kulishov S.K., VakulenkoK.Ye., O.M.Iakovenko Pecularities of cardiac remodeling, cytokines change, electrical myocardial instability in patients with chronic ischemic heart disease and arterial hypertension as predispose to making treatment decision // Supplement to Official Journal of the World Heart Federation "Global Heart" (World Congress of Cardiology Scientific Sessions, 2014, Incorporating the Annual Scientific Meeting of the Cardiac Society of Australia and New Zealand), 2014, March, Vol. 9, Issue 1S, e 169 (PT 023)
14. Kulishov S.K., Iakovenko O.M. Modeling Monitoring Of Age Dependent Diseases as A reflection Of Aging Genes Expressing International Journal of Modeling and Optimization (IJMO), Vol. 3, No. 1, February 2013, IACSIT. International Association of Computer Science and Information Technology, Singapore, p. 25-29.

Positive emotions every day to you!