Global Journal of Medical Research: A
Neurology & Nervous System
Volume 24 Issue 1 Version 1.0 Year 2024
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

A Neural Networks and Rules based System used to Find a Correlations, and Therefore Try to Maintain the State of Health, in Patient Affect by Multiple Sclerosis at the Origins of Well-Being at a Certain Time Daily Time with Clinical and the Musculoskeletal Exams

By Prof. PhD Eng. Francesco Pia

Abstract- In this work we will explore the fact that according to recent studies published in specialist medical journals, during the early morning sleep-wake hours, during the early morning sleep-wake hours. The idea we propose is the clinical-musculoskeletal monitoring of a certain number of MS patients for twenty-four hours so that they can collect data to train a neural network with an appropriate learning algorithm suitable for the purpose. The patients will first be hypothesized as such in the present work and in the subsequent ones a virtual patient will be developed, only in the last step will real patients be used whose data will be housed in the virtual container necessary to be able to present it to the learning system.

Keywords: Glia.

GJMR-A Classification: NLM: WL 140

A Neural Networks and Rules based System used to Find a Correlations, and Therefore Try to Maintain the State of Health, in Patient Affect by Multiple Sclerosis at the Origins of Well-Being at a Certain Time Daily Time with Clinical and the Musculoskeletal Exams

Prof. PhD Eng. Francesco Pia

Abstract- In this work we will explore the fact that according to recent studies published in specialist medical journals, during the early morning sleep-wake hours, during the early morning sleep-wake hours. The idea we propose is the clinical-musculoskeletal monitoring of a certain number of MS patients for twenty-four hours so that they can collect data to train a neural network with an appropriate learning algorithm suitable for the purpose. The patients will first be hypothesized as such in the present work and in the subsequent ones a virtual patient will be developed, only in the last step will real patients be used whose data will be housed in the virtual container necessary to be able to present it to the learning system. This learning system will be created for two main purposes: the first is to find the real connection between the state of well-being and certain hours of the day, the second is to find other correlations between clinical tests and tests that highlight the state of well-being, or less, skeletal muscle. In this work, especially in the next two, collaboration with clinical entities capable of giving the right scientific and operational support will be fundamental in order to "*transform*" the various patients into useful data for the neural system which will be described in the next work. In the following pages we would limit ourselves to describing the main idea with the pros and cons of the choices of concept and method, the tools and methods to use them for the desired purposes of the work in its widest extension and finally the expected results. It should be underlined that the work in its entirety, when achieved, can be used by any pharmaceutical companies interested in the contents, in the results achieved or achievable in order to create drugs or concrete treatment methods, if only to improve the standard of living of the patients and their families, lightening the burden that hospitals and various treatment centers are called upon to bear on a daily basis. Furthermore, two more articles are planned: the second after this with the formalization of the chosen software and various simulations with virtual patients and clinical examinations and finally the third with real and concrete patients and clinical data acquired in actual hospital clinics.

Keywords: *Glia.*

Author: Gonnosfanadiga (SU), Italy. e-mail: piafranc@hotmail.com www.gofundme.com keywords "Artificial intelligence vs Multiple Sclerosis"

I. Introduction

The undersigned has always studied, as a child, and with over a dozen works in which he is the sole author, [1]-[11], and is himself suffering from a secondary progressive form of MS that is blocking him as well as many patients and families around the world. He opened a fundraiser on "*www.gofundme.com*" with keyword "*Artificial Intelligence vs Multiple Sclerosis*" and in addition to thanking you, the author will make every effort to ensure that the funds raised are spent on the next steps which are certainly expensive.

In this article we will describe a system based on NNs and filters with production rules to train a system, therefore the NN with back-propagation learning algorithm, with three layers of perceptrons so that the state of well-being can be associated with the time *[12]* and therefore find some correlation that connects the two variables.

This is the first of a series of articles that will be written as the research continues. This is the first, the second will instead be based on the description of representation algorithms of the software that will be used for recognition and therefore with a broader description of the set of patients and the type of NN. Based on the second, the third will be created where real patients will be used instead of the virtual patient encapsulator. But all of this will be linked above all to raising funds for the continuation of the project, funds that cannot be taken for granted given the size and breadth of the undertaking. It must also be said about the scheme found in the next paragraph, that is, it is very summary and schematic, this is because the problems that will be found in the second step, therefore with virtual patients and in the third with real patients, many difficulties will be encountered and many precautions will be taken to overcome them; therefore making further graphs is currently useless because the difficulties are now unclear and many, all this is done by the undersigned who has therefore himself witnessed this pathology of what is hypothesized about the timetable *[12]*.

The following must also be considered: the incidence of MS on males and females, age, weight, residence... and other known indications, let's suppose that the incidence is 2 females and 3 males, this ratio is better implicitly present in the sample to be presented to the NN during the training phase so that this parameter is also learned.

Then, let's say that the training must be done on "healthy" patients? validation on "sick" patients? And the test on "sick but not too sick" patients. A schift must be made on the inputs because they are very many so there is a risk of either over-fitting the net or not fishing well given the small number of the output numerically speaking because it is still an evoked potential, therefore there are not a thousand inputs comparable to those we would have in output, therefore it will be necessary to appropriately choose a range to evaluate the inputs especially in the first NN.

II. Methods and Tools

This paragraph will describe the main scheme of the setup that will be used, also in the next works and the present one which mainly describes the idea, and the second one which involves the use of neural networks and the drafting of an algorithm especially by virtue of the fact that the patients will be virtually encapsulated while the third will be much more challenging because the use of "real" patients and interfacing with hospital realities with the related costs will be expected.

The following diagram is a particularly "simple" example because it only represents the preliminary project that will be described, represented in the figures *fig. 1, 2*. All this is obviously simple compared to the scale of the overall project. It is believed, as was said in the introduction, that it is not very useful to describe in depth these blocks which are part of the design represented in *fig. 1* as the difficulties that will be encountered will not be few and above all the methods used to describe and create the various components will not be simple, and the type of representation and its creation that one will want to follow is unpredictable.

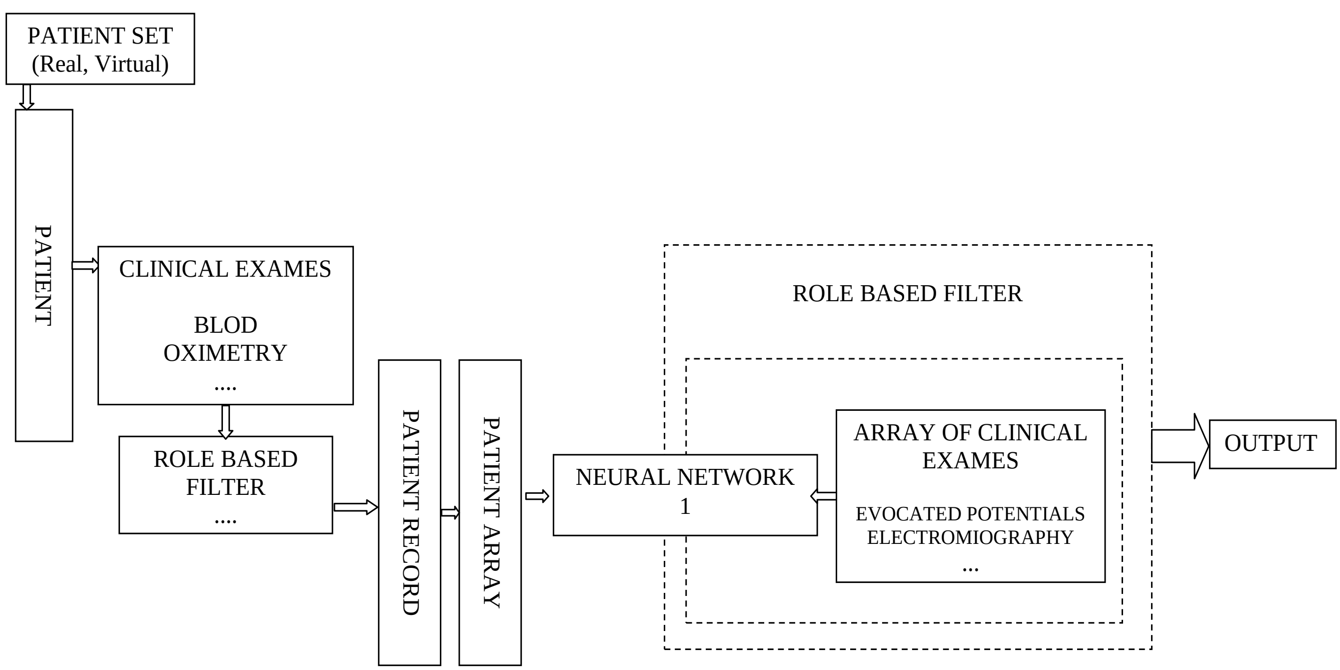

Fig. 1: This figure represents the original idea to train a neural network to distinguish an MS patient from a healthy one, as well as "memorizing" the cases seen in training.

For evoked potentials and electromyography, a filter based on output rules will be used, hoping to limit the number of inputs, and since they are numerous, it will be necessary to ensure that the NN *[12]-[44]* has a variable and selectable range for the inputs both in terms of position and as breadth; these aspects will concern the second job, not the first. Up to now we have discussed the project idea and mentioned the other two or three that will follow.

At this point the first neural network should be able to diagnose multiple sclerosis but that's just not what we would like. The following figure further highlights the potential of the diagnosis issued in figure *fig. 1*. An important factor for patient selection is the impact of MS on the male/female ratio which must be represented in the set of patients and therefore implicit in the selected sample. Training and validation should be assumed on healthy patients or testing on MS patients. Over-fitting must be avoided thanks to a schift on the inputs and to represent the output a little widely and the inputs must be appropriately chosen with a scissor variable in amplitude and position.

The next figure *fig. 2* shows the system mentioned in the introduction, i.e. a system capable of indicating significant parameters to be indicated to the clinician.

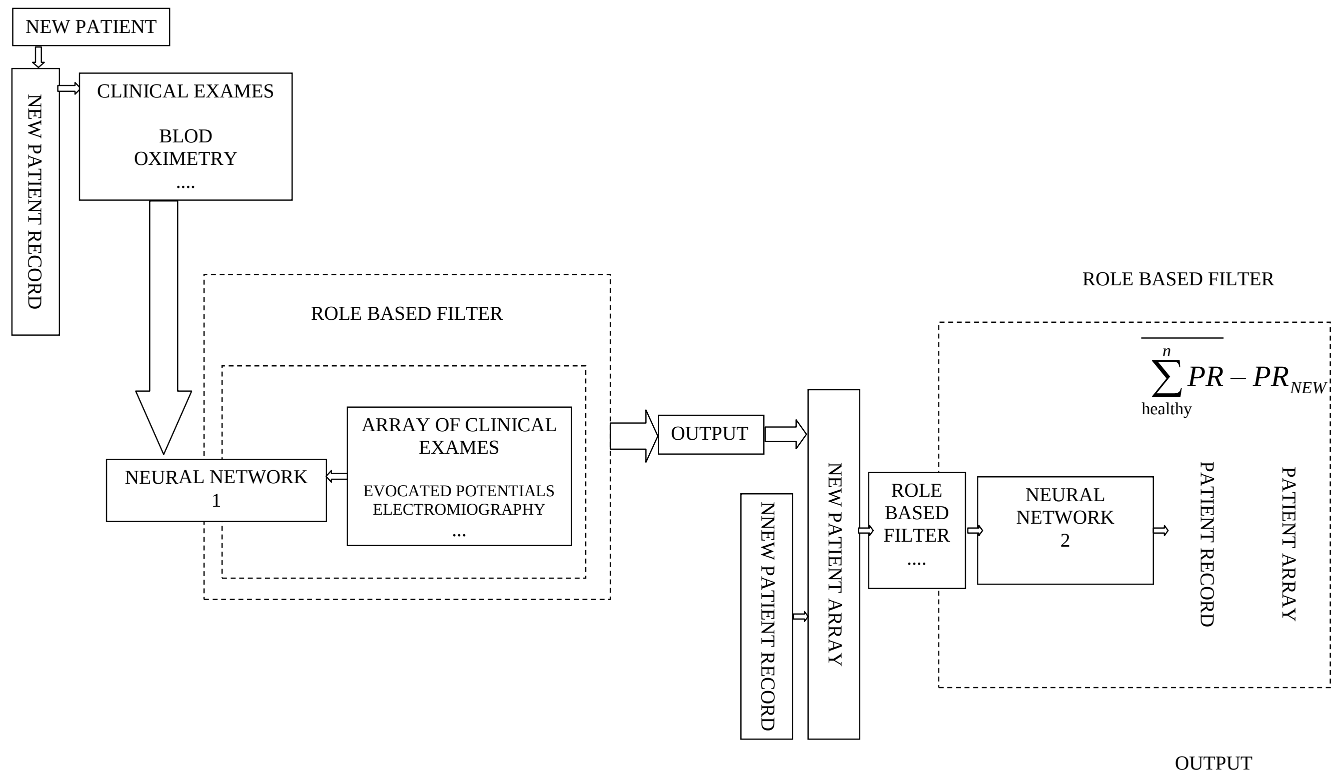

Fig. 2: This figure represents the second part of the system which could give important indications to the clinical doctor when outputs are ready.

In order to clarify better, is the training carried out on "healthy ?" patients and validation on those "sick ?" and the Test is a middle ground a little nuanced a little healthy a little sick and assuming that the system in *fig.1* is able to distinguish a healthy patient from a sick one, then where does the information reside?

The information and the result of the correct training of NN n°1 of the successful learning of the problem unknown until that moment; and up to this moment after having carried out the training: then an average is taken of the input vectors of the arrays of the patients of the healthy ones even if on the average the clue could be hidden, the truth the input of interest appears: therefore presenting a new case and at this point the network will say whether he is healthy or sick and the difference is made between the representative vector of the new case minus the average of healthy?, sick?, so we will see what are the variables in play that determine this difference between the representative vectors.

The schemes proposed in *fig. 1* and *2* should be considered a *cliché* that can also be used for other pathologies, this aspect is very important to point out.

III. Conclusion

As we intend to proceed after the pressing first step, at the end of this predominantly descriptive work on the idea of using NNs, two other steps are basically envisaged: the second will concern the IT setup of the entire set of objects relating to both the patients virtual and rule filters and also an intermediate step with the necessary simulations with a lot of work required. Once the correct functioning of the virtual patient encapsulator and the entire system has been verified, and the presence of sufficient funds has been verified, we will move on to talking about non-invasive experiments on real patients, then we will try to actually carry out the procedure that should respond, in part, to the question in the title of this work, thus giving indications to clinical doctors who are experts in the sector covered in this article.

Acknowledgment

An extraordinary thank you to all those who take care of people with physical and mental disabilities in particular a Pierpaolo eng. Furcas and family, my lovely family, Viviana S., Danilo Mallica, Maria Rita S., Alex Tomasi, MD Pierpaolo Vargiu, Alberto Urpi Caritas Diocesana di Cagliari (CA) IT.

References Références Referencias

1. Francesco Pia "I will be back", pp. 149, Ed. Amazon® Kdp, January 2019.
2. Francesco Pia "The liar knee", pp. 224, Ed. Amazon® Kdp, July 2019.
3. Francesco Pia "Genetic geometry", pp. 80, Ed. Amazon® Kdp, January 2019.
4. Francesco Pia " JEWEL: a cosmological model due to the geometrical displacement of galactic object like black, white and worm holes", ICCEA 2021: 15. International Conference on Cosmology and Extragalactic Astronomy; July 19-20, 2021 in Toronto, Canada.
5. Francesco Pia "How to Try to Get Antigravity From Electrical Circuits by an Almost Magnetic Monopole or from Anti Matter" in IRJAES, Volume 7, Issue 3, Date: 25/06/2022
6. Francesco Pia "A Computer System Based On Neural Network And Rules System Based For Find An Optimum Mix of Vaccine And/Or Drugs For mRNA Like Covid-19 Virus And Other Pathologies" in IRJAES, Volume 7, Issue 2, Date, 09/06/2022
7. Francesco Pia "POLIFEMO: a Teleportation Model Based on Object Like Black, White and Worm Hole for Electric Signal and Object Also Thinking and With Conscience" ID: IRJAES-V7N3P66Y22 June-Aug 2022 Issue Vol. 7 Issue 3 https://irjaes.com/volume-7-issue-3/
8. Francesco Pia "A Symmetry of Cosmological Model Named Jewell That Allows Re Entry Into The Starting Parallel Universe With Adequate Teleportation Based on Creation of Useful Stellar Object Like Black, Withe Holes", ICES-23-P1159, ICES2023, 6-8 February 2023, Riyadh, Saudi Arabia.
9. Francesco Pia "Neutron Concentrator, a Hypothetical Small Neutron "Star" based on the Emission of Neutrons in Minerals such as Granite and Other Commonly Available Objects" Global Journal of Researches in Engineering: E Publisher: Global Journals Civil And Structural Engineering Volume 23 Issue 1 Version 1.0 Year 2023 Type: Double Blind Peer Reviewed International Research Journal Online ISSN: 2249-4596 & Print ISSN: 0975-5861
10. Francesco Pia "A Natural Model for Dark Matter and Its Interaction with Stellar Objects such as The Galaxy Known as with Name "The Milky Way" American Journal of Biomedical Science & Research, 2023 19(5) JBSR.MS.ID.002630, DOI: 0.34297/AJBSR.2023.19.002630 Received: July 28, 2023; Published: August 07, 2023 pag. 616-621 Final PDf: PP-RW-23-0513 ISSN: 2642-1747
11. Francesco Pia "A Time-Machine, An Electro-Mechanical System That Have a Strange Behaviour Respect at Time" American Journal of Biomedical Science & Research, 2023 20(2) AJBSR.MS.ID.002681, DOI: 10.34297/AJBSR.2023.20.002681 Received: September 16, 2023; Published: September 21, 2023, pag. 122-126 Final PDf: PP-RW-23-0513 ISSN: 2642-1747
12. Luisa de Vivo, Michele Bellesi "The role of sleep and wakefulness in myelin plasticity" First published: 25 June 2019 https://doi.org/10.1002/glia.23667 GLIA WILEY
13. I. D'Antone "Intelligenza artificiale e diagnostica in sistemi complessi", in "L'ipercomplessità tra socio-sistemica e cibernetica. A cura di A. Ardigò, G. Mazzoli", pp.339-347, Ed. Franco Angeli, 1990.
14. A. Fanni, P. Zedda, F. Scintu "Artificial Neural Networks Approach for Anorectal Manometry Morphological Classification"; "A.I.I.M.B: Associazione Italiana di Ingegneria Medica e Biologica", in "Proceedings of the HEALTH TELEMATICS '95, 'Health in the Information Society', Luglio 1995; Ed. "M. Bracale and F. Denoth", Area di Ricerca -CNR- Pisa.
15. P. K. Sharpe, H. E. Solberg, K. Rootwelt, M. Yearworth "Artificial Neural Networks in Diagnosis of Thyroid Function from in Vitro Laboratory", in Clinical Chemistry, Vol. 39, n. 11, pp. 2248-2253, 1993.
16. K. Rootwelt, HE. Solberg "Free thyroxine, thyroxine/TBG ratio and other in vitro tests of thyroid function evaluated by discriminant analysis", Scand J Clin Lab Inves 1981, pp. 41-483, 1981.
17. T. Kohonen, "Self-Organizing formation of topologically correct feature map", Biological Cybernetics, n. 43, 1982.
18. P. Karakitsos, B. Cochand-Priollet, P. J. Cuillausseau, A. Pouliakis "Potential of the Back Propagation Neural Network in the Morphologic Examination of Thyroid Lesion", in "Analytical and Quantitative Cytology and Histology", vol. 18 No. 6, pp. 494-500, December 1996.
19. E. R. Carson, D. G. Cramp "The patient/clinical relationship, computing and the wider health care system", in 'Computer and Control in Clinical Medicine', ed. E. R. Carson, D. G. Cramp, New York: Plenum, pp. 245-257, 1985.
20. S. El Gamal, M. Rafeh e I. Eissa "Case-based reasoning algorithms applied in a medical acquisition tool", in 'Medical Information', vol. 18, no. 2, pp. 149-162, 1993.
21. S. El Gamal, M. Rafeh e E. F. Eissa "Knowledge acquisition system for clinical medicine. First national ezpert Systems and development Workshop", tenutosi il 26-28 febbraio, grazie al Ministero dell'Agricoltura, Cairo, Egitto, 1991.
22. D. Wakerman "A Guide to Expert System", MA: Addison Wesley, Cambridge 1985.
23. J. I. Nicolass, L. M. Perry "Tools for Knowledge Acquisition and Verfication in Medicine", IEEE, 1986

24. F. Pia, A. Casanova, S. Mariotti "Diagnosi on line remota dell'ipertiroidismo", 4th International Conference and Exhibition on Telemedicine, Information Technology and Telecommunications in Healthcare. 26th-28th September 2001, Genoa (Italy)
25. S. J. Russel, P. Norvig "Artificial Intelligence, A Modern Approach", Prentice-Hall. Inc., 1995.
26. B. G. Buchanan, E. A. Feigenbaum "Dendral and Metadendral: their applications dimension", in "Artificial Intelligence", vol. 11, 1978.
27. G. Bara "Intelligenza artificiale", Franco Angeli Editore, 1978.
28. R. Shank "Conceptual Information Processing", in Fundamental Studies in Computer scienze, vol. 3, Amsterdam 1975.
29. Y. Jang "HYDY: a Hybrid system with Feedbach for Diagnosis Multiple Disorders", M.I.T., 1993.
30. A. Casanova, P. Carta, A. Balestrieri, G. Bellu "Un sistema esperto per il supporto alla Diagnosi delle Broncopneumatopatie Professionali" Atti del Convegno AICA 1989, Vol. 2.
31. T. Khana "Fondamenti di reti neurali", Addison-Wesley, 1991.
32. G. Rindi, E. Manni "Fisiologia Umana", vol. 1, cap. II,III pag.9-52, cap.24 pag. 449-459, cap. 27 pag. 496-508, IV ed., Utet 1987.
33. R. Beale, T. Jackson "Neural Computing: An Introduction", Departement of Computer Scienze, University of York, Institute of Physics Publishing Bristol and Philadelphia, 1992.
34. Robert F. Schmidt con i contributi di Josef Dudel, Wilfrid Jänig, Manfred Zimmerman "Fondamenti di Neurofisiologia" ed. Zanichelli , 1990.
35. D. Floreano "Manuale sulle reti neurali", Il Mulino, 1996.
36. A. L. Hodgkin, A.F. Huxley "A quantitative Description of Membrane Current and its Application to Conduction and Excitation in Nerve", in 'Jouranal of Physiology (London)', vol. 108, pp 500-540, 1952.
37. J. Hertz, A. Krogh e R.G. Palmer "Introduction to the Theory of Neural Computing", Reedwood City, CA, Addison-Wesely, 1991.
38. D. E. Rumelhart, G. E. Hinton e J. R. Williams " Learning Representations by Back-Propagation of Errors" in 'Nature', vol. 323, pp. 533-536, 1986.
39. H. Demuth, M. Beal "Neural Network Toolbox, for Use with Matlab®", The Math Works Inc., january 1994.
40. D. Jones "Neural Networks for Medical Diagnosis, in Handbook of Neural Computing Applications", a cura di A. J. Maren, C.T. Hartson e R. M. Pap, London, Academic Press, 1990.
41. C. Stergiou, D. Siganos "Neural Networks", sito Internet (http://www-dse.doc.ic.ac.uk/~nd/surprise_96/ journal/vol4/cs11/report.html).
42. Ugo Teodori "Trattato di medicina interna" vol. 2 cap. 31 S. Mariotti L.Baschieri-E.Martino-G. Fenzi-L.Bartalena "Malattie della tiroide" pag. 1449-1512.
43. G. Delfino, E. Lanciotti, G. Liguori, M. Stefani "Biologia e medicina, dizionario enciclopedico di scienze biologiche e mediche, IT-GB, GB-IT", Zanichelli, 1990.
44. E. Rubenstein "Malattie causate da diffettosa comunicazione tra cellule", in "Le Scienze" n° 141, maggio 1980.