The "Electronic Pediatrician" (EPed) – a demo software for computer-assisted pediatric diagnosis and treatment implemented using Microsoft Visual Basic 6 (VB6), with extended applicability

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Andrei-Lucian Drăgoi[2] (version 1.0 published on: 1.12.2018; last update on: 1.12.2018)
MD Pediatric specialist with both interdisciplinary and transdisciplinary independent research (Bucharest, Romania), E-mail: dr.dragoi@yahoo.com

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Important note: The latest (free) version of this article can be downloaded from this URL)

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1st Motto: „Let us sacrifice our today so that our children can have a better tomorrow." (A. P. J. Abdul Kalam, Indian scientist and the 11th President of India from 2002 to 2007 (URL)

2nd Motto: „The greatest legacy one can pass on to one's children and grandchildren is not money or other material things accumulated in one's life, but rather a legacy of character and faith." (William Franklin Graham Jr., a prominent American Christian evangelist) (URL)

3rd Motto: „Pediatrics – what a joy, what a feeling of accomplishment when helping Nature heal its children or prevent their diseases and accidents!" (Andrei-Lucian Drăgoi, pediatrician specialist and independent researcher)

***See also other famous and profound quotes about children at this URL.**

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Abstract

This paper presents **EPed** (abbreviation for "**Electronic Pediatrician**"), which is a demo software for computer-assisted pediatric diagnosis and treatment built by the author in Microsoft Visual Basic 6 (VB6) (**VB6**), a software with extended applicability.

Keywords: "Electronic Pediatrician" (**EPed**); computer-assisted pediatric diagnosis and treatment; Microsoft Visual Basic 6 (**VB6**);

Important note (1). This atypical URL-rich paper (which maximally exploits the layer of hyperlinks in this document), chooses to use Wikipedia links for all the important terms used. The main motivation for this approach was that each Wikipedia web-article contains all the main reference (included as endnotes) on the most important terms used in this paper: it simply the most practical way to cite entire collections of important articles/books without using an overwhelming list of footnote/endnote references. The secondary motivation (for using Wikipedia hyperlinks directly included in keywords) was to assure a "click-away" distance to short encyclopedic monographs on all the (important) terms used in this paper, so that the flow of reading to be minimally interrupted.

Important note (2). This paper also exploits the advantages of the hierarchic tree-like model of presenting informational content which is very easy to be kept updated and well organized.

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[1] Online preprints DOI: 10.13140/RG.2.2.10002.09923
[2] Andrei-Lucian Dragoi research pages on: ResearchGate, Academia.edu, Vixra, GSJournal;

I. The "Electronic Pediatrician" (EPed) software demo

1) The author of this paper has built a very practical "**Electronic Pediatrician**" (abbreviated name: "**EPed"**), which is a demo software for computer-assisted pediatric diagnosis and treatment built by the author in Microsoft Visual Basic 6 (VB6) (VB6), a software with extended applicability. EPed development started from 2007 (when VB6 was still largely used) and continued up to present day, as a personal project of the author.

a. Although now considered obsolete, VB6 is very practical and very easy to learn (and teach!), still offering the possibility to rapidly create a very large palette of portable small/medium-sized software applications (which may prove both stable and feasible, even when runned directly on USB sticks/cards), mainly for personal use (as the author also uses VB6).

b. VB6 portable applications have the advantage of being compatible with all Microsoft Windows variants (from Windows XP to Windows 10).

c. VB6 is also advantageous for programming beginners because it has many existing derivatives, like Visual Basic for Applications (VBA) which can be learned quickly and can be used to create complex macros in Microsoft Office applications like Word or Excel.

d. VB6 has also two special visual (WYSIWYG-type) derivatives for creating Android applications: DroidBasic (created by KBasic Software company) and B4A (abbreviation from "Basic for Android"; created by Anywhere Software company).

2) Artificial intelligence in healthcare is an important area of health informatics, offering great results in the optimization of medical care efficiency and speed.

3) EPed is essentially a medical expert system, more exactly a clinical decision support system (and not exactly a computer-aided diagnosis system): EPed can be considered an example of artificial intelligence (but not in the strict sense of a system capable to learn without human aid), because EPed applies a specific searching and counting algorithm in a large medical database (also built by the author and organized in a specific format, as described next).

4) EPed works **not only as** a (pediatric) **symptom checker** (e.g. URL1-WebMD, URL2-Mayo, URL3-Isabel, URL4-HealthLine, URL5-RxList, URL6-HealthDirect, URL7-Infermedica etc.), **BUT ALSO** as a **clinical and paraclinical sign checker**, **a diagnostic probability estimator** and also as a **treatment adviser**. EPed uses a general medical algorithm of quantizing **the level of superposability** between the clinical and paraclinical status of a given patient and the characteristics of each disease (or syndrome) in part from a large set of possible diseases (which algorithm is inaccessible to human mind, given the relative complexity of the countings and the high number of diseases that are analyzed concerning this **superposability**).

After generating a list with proposed disease-diagnoses (in descending order of their empirically-estimated probabilities and related to a specific patient), EPed also offers additional information on **further investigations needed** in current clinical practice for an exact diagnosis AND ALSO additional information on the **treatment of each disease in part**.

5) EPed uses 3 major modules:

a. A database containing a demo set of 213 most common diseases and syndromes (which are shortly described in Romanian: the English variant of this database is still under construction). Each disease is synthesized in a simple text file (with ".txt" extension) with a fixed multi-section structure (with section titles cited in Romanian and also translated in English for this article):

[NUME BOALA/SINDROM]
(the name of the disease/syndrome)
[DEFINITIE]
(the medical definition of the disease)
[ETIOLOGIE]
(the etiology of the disease)
[EPIDEMIOLOGIE]
(the epidemiology of the disease)
[FIZIOPATOLOGIE]
(the pathophysiology of the disease)
[ANAMNEZA]
(the anamnesis elements of the disease)
[CLINICA]
(clinical symptoms and signs of the disease)
[EXAMEN FIZIC]
(the physical examination signs of the disease)
[IMAGISTICA]
(the medical imaging useful in the disease diagnosis and follow-up)
[LABORATOR]
(the medical laboratory analyses useful in the disease diagnosis and follow up)
[DIAGNOSTIC POZITIV]
(positive diagnosis criteria of the disease)

[DIAGNOSTIC DIFERENTIAL]
(the differential diagnosis of the disease)
[TRATAMENT]
(the treatment of the disease)
[PROGNOSTIC]
(the prognosis of the disease)
[EVOLUTIE]
(the evolution of the disease)
[COMPLICATII]
(the complications of the disease)
[BOLI CONEXE]
(other related disease to the current one described in the text file)

Important note. This demo EPed has also a secondary database of about 50 additional text files containing rare causes of specific clinical/paraclinical signs, causes (diseases) that aren't yet integrated as (detailed) disease text files in the EPed database. In this way, the demo version of EPed compensates the incompleteness of the diseases database and further expands EPed's diagnostic possibilities.

b. **A complex window-form (wth multple lists and buttons) containing the implemented algorithm** of quantizing **the level of superposability** between the clinical&paraclinical status of a given patient and the characteristics of each disease from the (previously described) medical database.

c. **A database of patients**, which is also organized in separate text files, one file per each patient (containing the set of clinical&paraclinical signs of that patient, but also the chosen treatment).

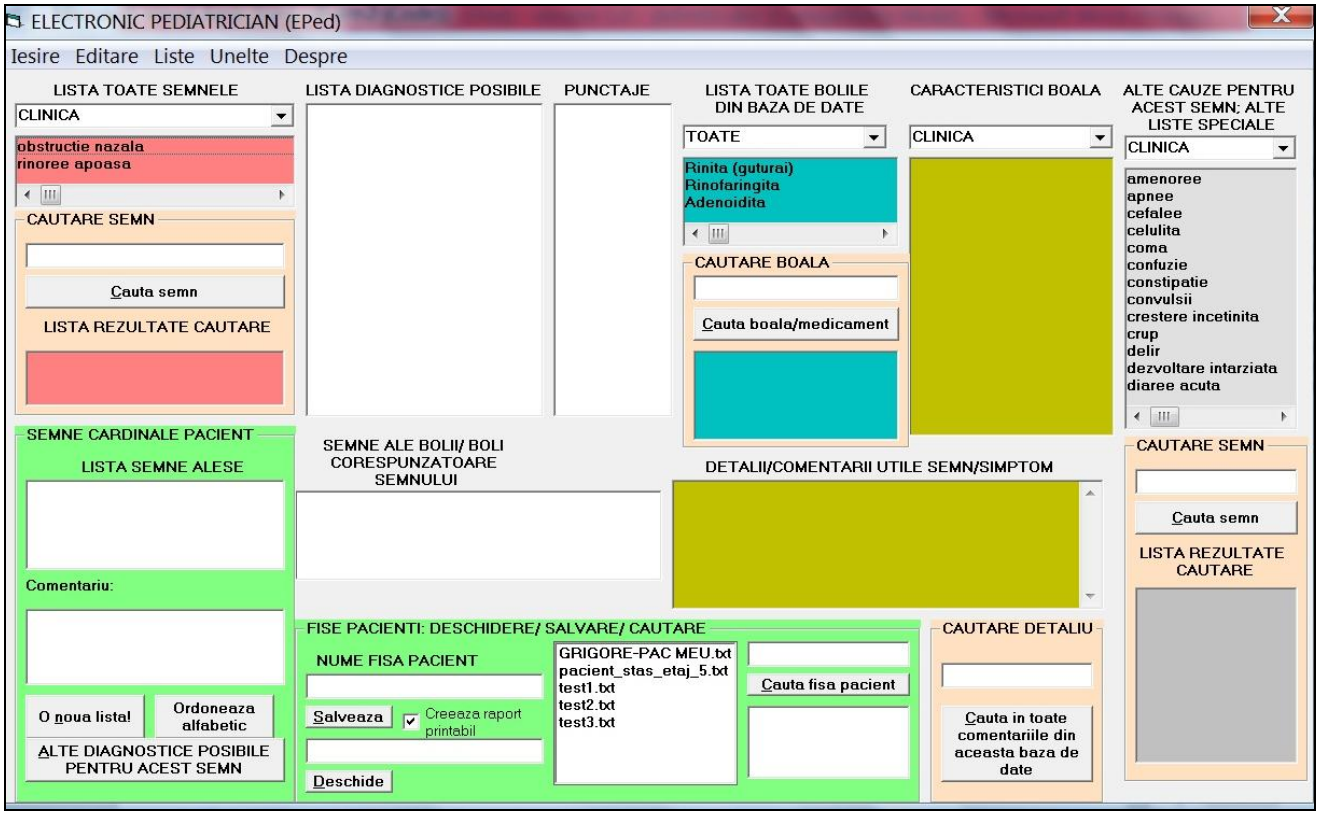

Figure I-1. **The main VB6-form of EPed with its 8 major VB-lists**.

6) EPed uses a simple main VB6-form with 5 major (labeled) VB6-lists named such as (**see Figure I-1**):

a. "**LISTA TOATE SEMNELE**" **VB-list (in English: "THE LIST OF ALL SIGNS")**, which displays all the elements of a specific chosen type (clinical/paraclinical etc), a type selected from the Combo Box immediately above it.

b. "**LISTA REZULTATE CAUTARE**" **VB-list (in English: "THE LIST OF SEARCH RESULTS")**, which displays the search results when searching the entire "**LISTA TOATE SEMNELE**" VB-list using a specific word or word fragment.

c. **"SEMNE CARDINALE PACIENT" VB-list (in English: "THE LIST OF (ALL) PATIENT'S CARDINAL SIGNS")**, which displays all the clinical/paraclinical/treatment elements of a given patient, elements that can be introduced only from the preexisting "**LISTA TOATE SEMNELE**" VB-list.

d. "**LISTA DIAGNOSTICE POSIBILE**" **VB-list (in English: "THE LIST OF ALL POSSIBLE DIAGNOSES")**, which displays all possible diseases that may (totally or partially) explain (by **superposability**) the clinical profile (containing one or more clinical and/or paraclinical elements) of any given patient.

e. "**PUNCTAJE**" **VB-list (in English: "SCORES")**, which displays the degree (expressed in percents) to which a specific disease may "cover" (explain) the clinical&paraclinical elements of a given patient, BUT ALSO the degree (also expressed in percents) to which a given patient (with given clinical&paraclinical elements) "covers" the full set of elements of any disease in the "**LISTA DIAGNOSTICE POSIBILE**" **VB-list.**

f. **"LISTA TOATE BOLILE DIN BAZA DE DATE" VB-list (in English: "THE LIST OF ALL DISEASES FROM THE DATABASE")**, which displays all the diseases from the database, so that any specific disease (proposed as possible) can be rapidly visualized with a simple click on any element of this VB-list.

g. **"ALTE CAUZE PENTRU ACEST SEMN" VB-list (in English: "OTHER CAUSES FOR THIS SIGN")**, which displays other causes for a selected sign, causes that aren't yet fully integrated as disease text files in EPed database.

h. **"FISE PACIENTI" VB-list (in English: "PATIENT FILES")**, which displays all the recorded patient medical files edited and saved with EPed.

A PATIENT SIMULATION DEMONSTRATION:

1) **EPed has also a subroutine generating random combinations of clinical&paraclinical signs** for a theoretical/virtual patient, **for diagnosis training** of students and medical doctors.

2) **For example**, an EPed simulation of a virtual patient presenting with a chosen set of clinical signs and symptoms ("febra" [**fever**], "tuse productiva" [**wet cough**], "rinoree" [**nasal secretions**], "adenopatie laterocervicala" [**laterocervical adenopathy**]) looks like this (**see the next figures**):

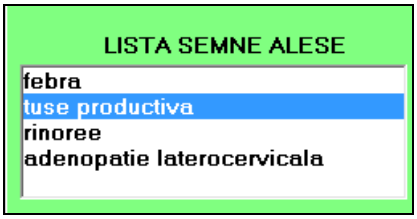

Figure I-2a. The chosen set of 4 clinical signs.

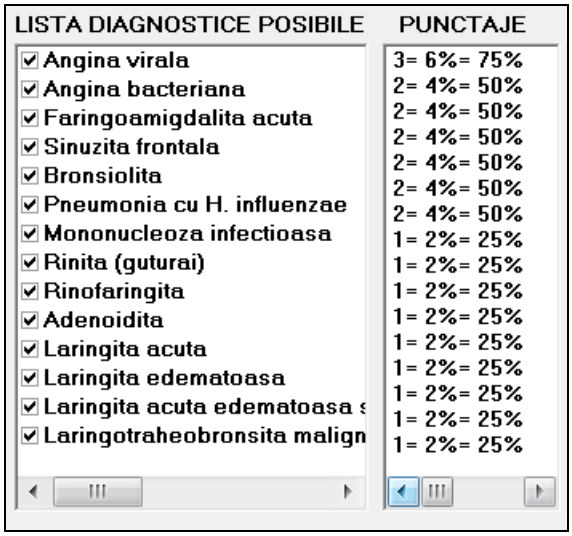

Figure I-3a. The 1st column of possible diagnoses (each with its own scores) of the virtual patient presenting the set of (previously) chosen 4 clinical signs.

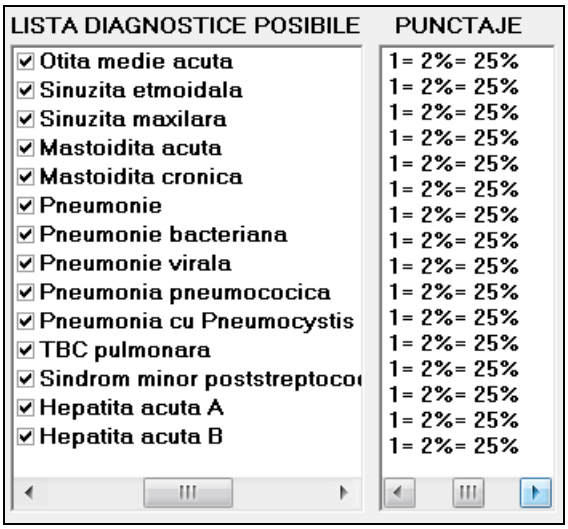

Figure I-3b. The 2nd column of possible diagnoses (each with its own scores) of the same virtual patient.

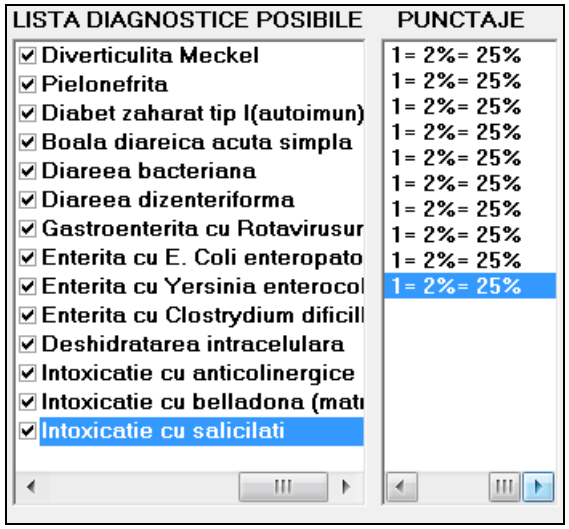

Figure I-3c. The 3rd column of possible diagnoses (each with its own scores) of the same virtual patient.

Important explanation (1). The first number (**N1**) of each score represents the number of patient's signs/symptoms that are explainable by that possible diagnostic disease; **the 2nd number** of the score (**N2**) represents the ratio (%) between N1 and the total number of signs/symptoms of that specific possible diagnostic disease; **the 3rd number** of the score (**N3**) represents the ratio between N1 and the total number of signs/symptoms of that specific patient;

Important explanation (2). All the possible diseases for a given patient are listed in a **descendent order** from the maximum N1 to the minimum N1.

Important note. **EPed can also generate a suggestive diagram** illustrating the **superposability** between the clinical and/or paraclinical profile of the patient (a **red circle** with radius proportional to the number of clinical and/or paraclinical signs of that patient) and the set of elements of a specific disease (represented as a **green segment** with length proportional to the maximum number of possible clinical and/or paraclinical signs of a disease from the database). **See the next figure:**

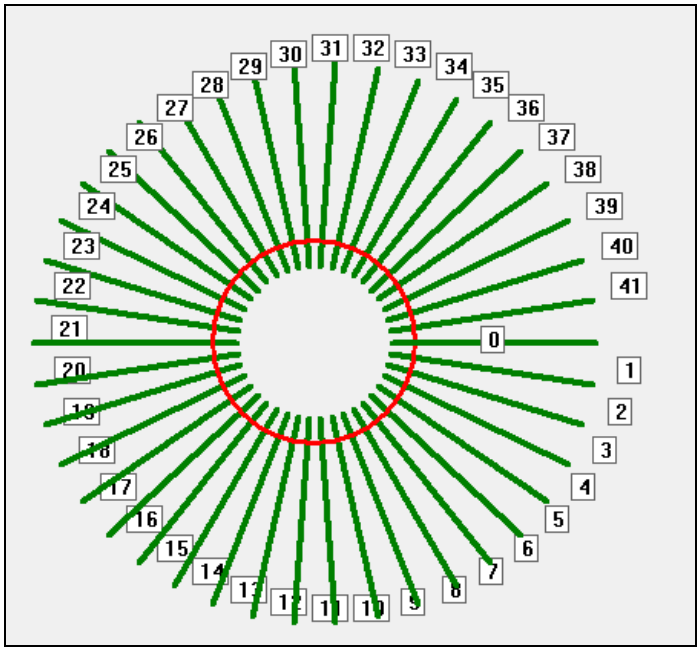

Figure I-4. The diagram illustrating the superposability between the clinical and/or paraclinical profile of the patient and each possible diagnostic disease in part.

OTHER IMPORTANT FACTS ON EPed:

3) **EPed (compatible with any Microsoft Windows version) is functional but still under periodic refinement** for future online selling, as multi-purpose software: that is why it isn't available online yet. EPed also contains 2 additional minor/secondary modules:
   a. **A special web browser** which can search for any given term on multiple medical sites/platforms simultaneously;

   b. **A special text editor** that highly simplifies the process of creating and editing diseases text files for EPed.

4) **EPed also has a demo version implemented in VB Script** which is only functional in Microsoft Internet Explorer (**MIE**) (but also in Google Chrome (**GC**) by using its IE Tab extension, which is an emulator of MIE "inside" GC). See this URL for testing.

5) **EPed also has a demo version implemented in Embedded Visual Basic for Pocket PCs**: this version isn't available online yet.

6) **A JavaScript version of EPed is also under construction.**

7) **Another VB6 alternative variant of EPed is also under construction.**

8) **Another Android EPed variant is also under construction.**

9) **EPed can be used in hospitals, policlinics, individual cabinets, online platforms and for personal purposes, including learning and teaching pediatrics at any level.**

10) **A future English version of the EPed demo is also under construction.**

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II. Endnote reference

Blank section (as all references were directly inserted as hyperlinks in the main text)