GENERALIZED NET MODELS IN CHILD NEUROLOGY (CN062: THE USE OF ANTICONVULSANT DRUGS)[2]

Tz. Koleva[1], J. Sorsich[2], A. Shannon[3], S.-K. Kim[4], Y. Kim[5]

[1] Technical University, Sofia, Bulgaria,
e-mail: $tzvety_koleva@av.bg$
[2] CLBME - BAS, Acad. G. Bonchev Str., Bl. 105, Sofia-1113, Bulgaria,
e-mail: $sorsich@bgcict.acad.bg$
[3] KvB Institute of Technology, North Sydney, 2060, & University of Technology, Sydney, 2007, Australia
e-mail: $tony@kvb.edu.au$
[4] Dept. of Statistics Chonbuk National University Chonju, Chonbuk 561-756, Korea
e-mails: $soonki@moak.chonbuk.ac.kr$, $soonki@stat.chonbuk.ac.kr$
[5] Dept. of Neurology, Chonbuk National University, Medical School Chonju, 560-182, Korea

The aim of the present paper is to construct a Generalized Net (GN; see [1]) describing the process of diagnosing of use of anticonvulsant drugs. The paper will be an element of a future book prepared by the "Prof. M. Drinov" Academic Publishing House.

All GN-notations are used as in [1].

The described diagnostic process is based on a scheme from [2].

The tokens enter the GN with an initial characteristic "patient who uses AntiConvulsant Drugs (ACD)".

$$Z_1 =< \{l_1\}, \{l_2\}, \frac{\begin{array}{c|c} & l_2 \\ \hline l_1 & TRUE \end{array}}{} >.$$

The tokens obtain the characteristic "determination of seizure type, choose of first ACDs and baseline blood studies are necessary" in place l_2.

$$Z_2 =< \{l_2\}, \{l_3, l_4\}, \frac{\begin{array}{c|c|c} & l_3 & l_4 \\ \hline l_2 & W_{2,3} & W_{2,4} \end{array}}{} >,$$

$W_{2,3}$ = "the patien is seizure free",
$W_{2,4} = \neg W_{2,3}$.

The tokens obtain the characteristic "check ACD blood level" in places l_3 and l_4.

$$Z_3 =< \{l_3, l_9\}, \{l_5, l_6\}, \frac{\begin{array}{c|c|c} & l_5 & l_6 \\ \hline l_3 & W_{3,5} & W_{3,6} \\ l_9 & W_{9,5} & W_{9,6} \end{array}}{} >,$$

$W_{3,5} = W_{9,5}$ = "the blood level is terapeutic",
$W_{3,6} = W_{9,6} = \neg W_{3,5}$.

The tokens do not obtain any characteristic in places l_5 and l_6.

$$Z_4 =< \{l_4, l_{11}\}, \{l_7, l_8\}, \begin{array}{c|cc} & l_7 & l_8 \\ \hline l_4 & W_{4,7} & W_{4,8} \\ l_{11} & W_{11,7} & W_{11,8} \end{array} >,$$

$W_{4,7} = W_{11,7} =$ "the blood level is terapeutic",
$W_{4,8} = W_{11,8} = \neg W_{4,7}$.

The tokens obtain the characteristic "increase dosage or add new ACD" in place l_7 and they do not obtain any characteristic in place l_8.

$$Z_5 =< \{l_6, l_{14}\}, \{l_9, l_{10}\}, \begin{array}{c|cc} & l_9 & l_{10} \\ \hline l_6 & W_{6,9} & W_{6,10} \\ l_{14} & W_{14,9} & W_{14,10} \end{array} >,$$

$W_{6,9} = W_{14,9} =$ "the patient is not compliant",
$W_{6,10} = W_{14,10} = \neg W_{6,9}$.

The tokens obtain the characteristic "advise the patient for correct use of the medicaments" in place l_9 and "adjust dosage and recheck ADC levels are necessary" in place l_{10}.

$$Z_6 =< \{l_6, l_{17}, l_{19}\}, \{l_{11}, l_{12}\}, \begin{array}{c|cc} & l_{11} & l_{12} \\ \hline l_8 & W_{8,11} & W_{8,12} \\ l_{17} & W_{17,11} & W_{17,12} \\ l_{19} & W_{19,11} & W_{19,12} \end{array} >,$$

$W_{8,11} = W_{17,11} = W_{19,11} =$ "the patient is not compliant",
$W_{8,12} = W_{17,12} = W_{19,12} = \neg W_{8,11}$.

The tokens obtain the characteristic "advise the patient for correct use of the medicaments" in place l_{11} and "adjust dosage is necessary" in place l_{12}.

$$Z_7 =< \{l_{10}\}, \{l_{13}, l_{14}\}, \begin{array}{c|cc} & l_{13} & l_{14} \\ \hline l_{10} & W_{10,13} & W_{10,14} \end{array} >,$$

$W_{10,13} =$ "the blood level is terapeutic",
$W_{10,14} = \neg W_{4,13}$.

The tokens do not obtain any characteristic in places l_{13} and l_{14}.

$$Z_8 =< \{l_7, l_{12}\}, \{l_{15}\}, \begin{array}{c|c} & l_{15} \\ \hline l_7 & TRUE \\ l_{12} & TRUE \end{array} >.$$

The tokens obtain the characteristic "recheck ADC blood levels is necessary" in place l_{15}.

$$Z_9 =< \{l_{15}\}, \{l_{16}, l_{17}\}, \begin{array}{c|cc} & l_{16} & l_{17} \\ \hline l_{15} & W_{15,16} & W_{15,17} \end{array} >,$$

$W_{15,16} =$ "the blood level is terapeutic",
$W_{15,17} = \neg W_{15,16}$.

The tokens do not obtain any characteristic in places l_{16} and l_{17}.

$$Z_{10} =< \{l_{16}\}, \{l_{18}, l_{19}\}, \begin{array}{c|cc} & l_{18} & l_{19} \\ \hline l_{16} & W_{16,18} & W_{16,19} \end{array} >,$$

$W_{16,18} =$ "the patien is seizure free",
$W_{16,19} = \neg W_{16,18}$.

The tokens do not obtain any characteristic in places l_{18} and l_{19}.

$$Z_{11} =< \{l_5, l_{13}, l_{18}\}, \{l_{20}\}, \begin{array}{c|c} & l_{20} \\ \hline l_5 & TRUE \\ l_{13} & TRUE \\ l_{18} & TRUE \end{array} > .$$

The tokens obtain the characteristic "maintainance or monitoring of ACD blood levels and end organ function periodically are necessary; after seizure-free interval, attempt to gradually taper and discontinue ACD treatment; go to CN061" in place l_{20}.
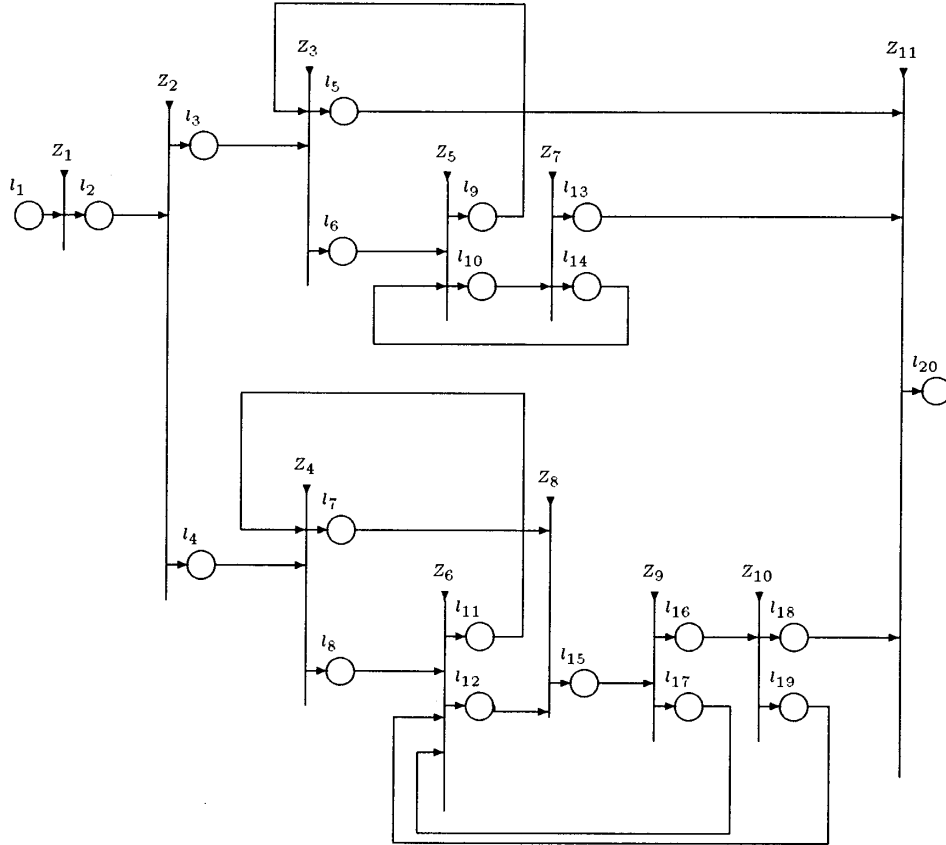
Reference:

[1] Atanassov, K. Generalized Nets. World Scientific, Singapore, New Jersey, London, 1991.

[2] Dunn D., L. Epstein, Decision Making in Child Neurology. B. C. Decker Inc., Toronto, 1987.