

Coding system for AUT-QE

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Coding system for AUT-QE.

by N.G. de Bruijn.

The expressions and categories to be stored are all of the form EXPRESSION, as defined in the following syntax. The notion is a slight extension of those explained in [2] and [3].

The basic symbols are

type | genre | , | [|] | { | } | (|)

and, furthermore, the elements of the sets <variable>, <constant> and <dummy variable>. These three sets are disjoint; <variable> and <constant> contain positive integers only; <dummy variable> contains integers < -1000 only.

The notions <EXPRESSION> and <EXPRESSION string> are defined by:

<EXPRESSION string> ::= <EXPRESSION> | <EXPRESSION string> , <EXPRESSION>
<EXPRESSION> ::= type | genre | <constant> | <variable> | <dummy variable> |
 <constant> (<EXPRESSION string>) | { <EXPRESSION> } <EXPRESSION> |
 [<dummy variable> , <EXPRESSION>] <EXPRESSION>

There are three arrays in which the information about EXPRESSIONs and EXPRESSION strings is stored: list1[1:P], list2[1:P], list3[1:P].

Every integer k ($1 \leq k \leq P$) refers to an EXPRESSION string. In our present discussion we shall denote this string by Ω_k (metalingual symbol). If Ω_k has the form Ω_h , Λ (where Λ is an EXPRESSION) then we have list 1[k] = h; if Ω_k has the form Λ , where Λ is an EXPRESSION, we have list 1[k] = 0. The information about Λ is stored in list 2[k] and list 3[k].

If $\Lambda = \text{type}$ then list 2[k] = 0, list 3[k] = -1000.

If $\Lambda = \text{genre}$ then list 2[k] = 0, list 3[k] = -2000.

If $\Lambda = c$, where $c \in \text{<constant>}$, then list 2[k] = c, list 3[k] = 0.

If $\Lambda = x$, where $x \in \text{<variable>}$, or $x \in \text{<dummy variable>}$, then list2[k] = x, list3[k] = -5000 or -4000.

The entry -4000 should not be used if Ω_k is not an indicator string (Ω_k is certainly no indicator string if x is a dummy variable).

If Λ has the form $c(\text{<EXPRESSION string>})$, and if that EXPRESSION string is Ω_h , then

list2[k] = c, list3[k] = h.

If Λ has the form $\{\Lambda_1\} \Lambda_2$, and if Ω_h is the EXPRESSION string Λ_1 , Λ_2 (this string consists of just two expressions), then

list2[k] = -12, list3[k] = h.

If Λ has the form $[t, \Lambda_1] \Lambda_2$, and if Ω_h is the expression string Λ_1, Λ_2 , then

$$\text{list2}[k] = t, \quad \text{list3}[k] = h.$$

Note that the above system is obtained from the one in [1] for expressions of the form <constant> (<expression string>) if we add the following conventions:

<u>type</u>	is considered as	$0(\Omega_{-1000})$
<u>genre</u>	" " "	$0(\Omega_{-2000})$
c	" " "	$c(\Omega_0)$
x	" " "	$x(\Omega_{-4000})$ or $x(\Omega_{-5000})$
t	" " "	$t(\Omega_{-5000})$
$\{\Lambda_1\} \Lambda_2$	" " "	$-12(\Lambda_1, \Lambda_2)$
$[t, \Lambda_1] \Lambda_2$	" " "	$t(\Lambda_1, \Lambda_2)$

We did not put the empty string into our syntax. Nevertheless we consider the empty string occasionally, and we give it list number 0, i.e. Ω_0 represents the empty string.

We remind the reader of the definition of indicator string. An indicator string is either the empty string or a string of variables (satisfying the condition that the indicator string of the last variable is obtained by taking that last entry away). In the non-empty case it can, of course, be considered as an EXPRESSION string and will be stored as such.

The contents of a book are stored in three arrays: $\text{indstr}[1:m]$, $\text{middle}[1:m]$, $\text{cat}[1:m]$.

If $1 \leq n \leq m$, and if the indicator string of the n-th line of the book is Ω_k , then $\text{indstr}[n] = k$.

If the middle part of the n-th line is an EXPRESSION Λ , and if Ω_k is the string consisting of the single entry Λ , then $\text{middle}[n] = k$. (Note that $\text{list1}[k] = 0$ in this case.)

If the middle part of the n-th line is PN, then $\text{middle}[n] = -1$.

If the middle part of the n-th line is EB, and if Ω_k is the extended indicator string of that line (i.e. the indicator string followed by n) then $\text{middle}[n] = -100 - k$.

If the middle part of the n-th line is not EB, and if $\text{cat}[n] = k$, then Ω_k is the EXPRESSION string consisting of just one entry, viz. the category part of the n-th line. (Whence $\text{list1}[k] = 0$ in this case.) If, however, the middle part is EB, then Ω_k is the category string of the extended indicator string of

that line. (If x_1, \dots, x_j, n is the extended indicator string, then this category string is $\Gamma_1, \dots, \Gamma_j, \Gamma_{j+1}$, forming the categories of x_1, \dots, x_j, n , respectively.)

Note that this difference between EB or non-EB applies to list1[cat[n]] only.

References.

- [1] N.G. de Bruijn, A Processor for PAL. Internal report, Notitie 30, (26 maart 1970), Technological University Eindhoven.
- [2] ————— The syntax of PAL and AUTOMATH, Technological University Eindhoven, Internal Report, Notitie 32, (9 April 1970).
- [3] ————— On the use of bound variables in AUTOMATH, Technological University Eindhoven, Internal Report, Notitie 9, (26 November 1970).