2.5 Method of sequential branching.

The given method represents a procedure of step-by-step branching at which on each step the best variant of division gets out.

Let the possible allowable complexity of a tree (for example, number of leaves M_{max}) be given. The method consists of the following steps (figure 12).

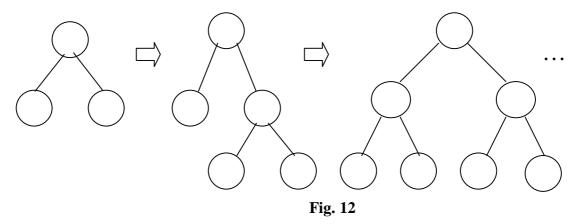
1) To divide the root into the given number of new nodes, using all variants of division by each characteristic X_i from $X_1,...,X_n$ by turns. The best variant of division by the given criterion of quality is saved.

2) To check up the degree of promise of branching for each of new child nodes. If a node becomes a leaf, we give to it the appropriate decision.

3) Each node (not leaf) is divided into new nodes similarly to item 1.

If branching of the given node does not improve the quality of a tree (or quality is improved, but it is less than the given threshold) branching is not made; the node becomes leaf and a decision is attributed to it.

After that, steps 2,3 are repeating until there will be no more perspective nodes for branching, or the maximal possible complexity of a tree will not be achieved.



The described method is the simplest and the fastest in execution. However, the problem of the given method is that when there are large allowable complexity and small sample size, the received tree, as a rule, is excessively 'optimistic' ('overtrained'). In other words, the prediction error determined on training sample will be much smaller than the 'true' error. This effect arises because observations are random and a tree, which depends on them, catches also random laws.

One more problem appears when characteristics have complex dependence between each other. The received decision, as a rule, will not coincide with optimum. It happens because on each step one characteristic is considered only, without taking into account its interrelations with others.