

DECISION MAKING TECHNIQS FOR ACQUIRING PLAYERS WHO ADAPT TO DIFFERENT SYSTEMS OF PLAY

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Abstract. Over the last few year we have drawn up several models that have allowed us to optimize the selection of players for incorporation into a determined sport team. These options could complied with by assigning, when we already had at our disposal the necessary means (the complete team), to each of the positions of the tactical system, that is, those players that complied with, at any precise moment, all and each one of the characteristics that were necessary for each position. Nevertheless, the optimum result that is possible to obtain thanks to the use of the proposed algorithms, could be in vain if the maximum person responsible for the team were to opt, for whatever reason, to change the "philosophy of play". We propose a optimal way.

It is obvious that throughout an annual competition, the different technically responsible persons (or trainers) of a team may decide, that for tactical reasons or reasons of "force majeure", to change the system of play. This may even include the typical cases where bad results attained at the short term "oblige" the senior manager to dismiss the trainer and welcome a new one, which event is usually received skeptically by the fans. This team was conceived and designed to work with a trainer and one system of play and now, few of the players will be able to comply with the new schemes of the new "Mister".

Both situations may be a consequence of the lack of foresight on forming the team or by the extreme speed with which it was decided to dismiss the person in charge at the time. For this reason we intend to delve deeper into the importance acquired by the fact of being able to count on each and every one (from the most important to the least significant) of the characteristics, qualities and peculiarities that the ideal player must have, for one or several positions. These must be carefully and conveniently valued (as we already know), in fuzzy logic, between 0 and 1 by good experts, and if necessary, granting different weights, to each of them according to their worth.

The process for signing on players, taking into account their adaptability to different playing systems, passes through establishing the ideal player for one type of game and repeating the process with the same characteristics, qualities and peculiarities with another/other player/s that are ideal for the alternative systems.

Basic elements of the proposed scheme

We can now ask ourselves what would be the path to follow when what is expected of a player is his greater suitability for covering the position or positions on the team, which at any given time, may change the tactical system according to the needs of the team manager who is responsible for training the team throughout one or several seasons. For example, a football players who is capable of playing as central defender in a team with tactical tendencies similar to those used in English football may not be suitable for a trainer with a philosophy of attack, similar to that used in Dutch football. What is needed then is to seek the player who can be as good for one or the other of these trainers.

The easiest solution (despite not the more effective) to this problem will be the relative Hamming Distance.

Let us now move on to a general description, in order later to move on to numerical examples. For this, in the first place, we will tackle the representation by description of all the playing systems for the selected position(s).

What we are trying to do, by means of the scheme already presented at the ICAI'99 Congress, is to establish an "ideal profile" of the player we are looking for, which player must have all those profiles relative to each one of the tactical moves to which the team can opt. This is as if only one single ideal player existed who complied perfectly with the necessary requirements for all the playing systems to which the team may have access.

The description of this ideal adaptive player can be shown by means of a single fuzzy sub-set, which is the result of joining the fuzzy sub-sets of the different ideal players for the different philosophies of play to be covered

Now let us look at the form this fuzzy sub-set acquired from a general perspective.

We will call the candidate players for occupying a certain or certain determined position or positions on the team $j = 1, 2, \dots, m$, and their characteristics, qualities or peculiarities $C_i, i = 1, 2, \dots, m$, (some of these being required not to pass a certain ideal level, other allowing this). Also to be noted are the $h = 1, 2, \dots, z$ possible philosophies of play to be used by the team. From this information we will arrive at the following z fuzzy sub-sets, which describe each one of the players who for his particular position would adapt perfectly to a pre-established tactical system:

$$D_h = \begin{array}{|c|c|c|} \hline C_1 & C_2 & C_3 \\ \hline \mu_{1h} & \mu_{2h} & \mu_{3h} \\ \hline \end{array} \dots \begin{array}{|c|c|} \hline C_{n-1} & C_n \\ \hline \mu_{n-1h} & \mu_{nh} \\ \hline \end{array} \quad h = 1, 2, \dots, z$$

The grouping of all these in a single fuzzy sub-set would show the following:

$$D_{1, 2, \dots, z} = \begin{array}{|c|c|} \hline C_1 & C_2 \\ \hline \mu_{11} & \mu_{21} \\ \hline \end{array} \dots \begin{array}{|c|c|c|} \hline C_n & C_1 & C_2 \\ \hline \mu_{n1} & \mu_{12} & \mu_{22} \\ \hline \end{array} \dots \begin{array}{|c|c|c|} \hline C_n & C_1 & C_2 \\ \hline \mu_{n2} & \mu_{13} & \mu_{23} \\ \hline \end{array} \dots \\ \dots \begin{array}{|c|c|} \hline C_n & C_1 \\ \hline \mu_{n3} & \mu_{14} \\ \hline \end{array} \dots \begin{array}{|c|c|c|} \hline C_n & C_1 & C_2 \\ \hline \mu_{n4} & \mu_{1z-1} & \mu_{2z-1} \\ \hline \end{array} \dots \begin{array}{|c|c|} \hline C_n & C_1 \\ \hline \mu_{nz-1} & \mu_{1z} \\ \hline \end{array} \dots \begin{array}{|c|} \hline C_n \\ \hline \mu_{nz} \\ \hline \end{array}$$

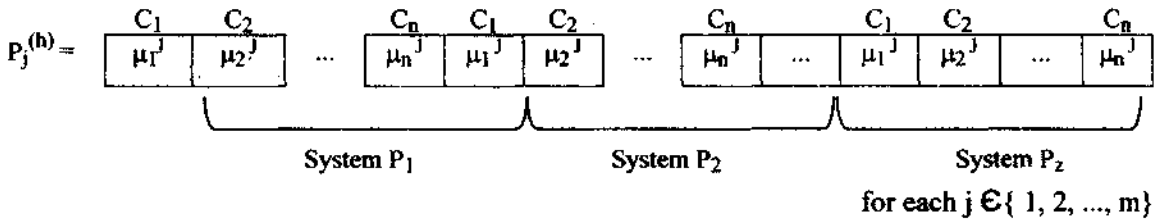
This fuzzy sub-set shows the ideal profile of the player who would adapt to the different playing systems.

If, as we have already pointed out, the number of candidate players is $j = 1, 2, \dots, m$, a fuzzy sub-set $P_j^{(h)}$, can be constructed for each one of them, by repeating z times the fuzzy sub-set P_j that describes their characteristics, qualities or peculiarities.

Starting out from the basic fuzzy sub-set:

$$P_j = \begin{array}{|c|c|} \hline C_1 & C_2 \\ \hline \mu_1^{(j)} & \mu_2^{(j)} \\ \hline \end{array} \dots \begin{array}{|c|c|} \hline C_{n-1} & C_n \\ \hline \mu_{n-1}^{(j)} & \mu_n^{(j)} \\ \hline \end{array}$$

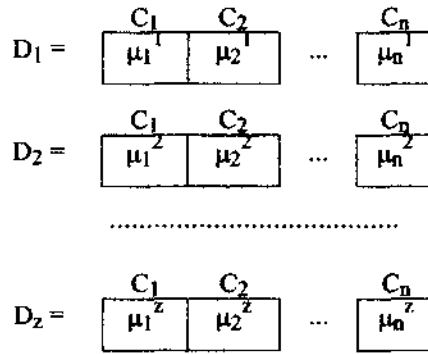
We arrive at then, fuzzy sub-sets, such as:



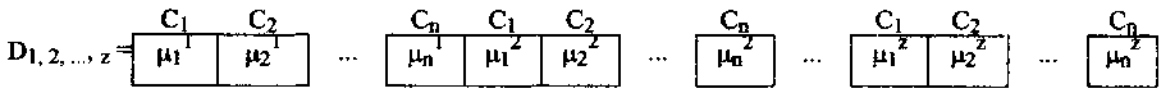
By arriving at the relative Hammig Distance, we obtain the order of preference between the players opting for the position on a team that is characterized by constant changes in playing systems.

Process for obtaining results

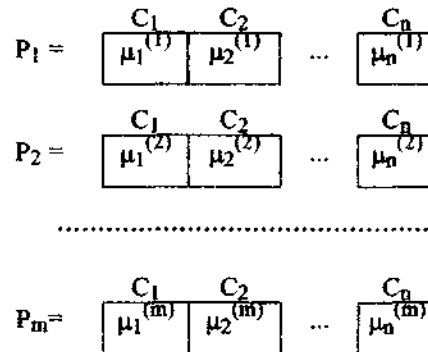
With the above in mind, we are now going to commence the proposed process for obtaining the ideal profile of the player who adapts perfectly to the different playing systems, by starting out from the following z fuzzy sub-sets that describe the ideal players who would fit in perfectly with the different playing philosophies.



The ideal profile of the “adaptable payer” will be, as we have already shown:



For opting to this position there are m players, whose description is given as we already know by the fuzzy sub-sets which will have the same referential as the previous descriptors:



Each one of these will be described in triplicate in order to seek an approach relative to the player considered as ideal:

