

CLAIMS

1.- A score explanation method for explaining a score (Ux) associated with a vector (x) of a first number (N₁) of parameters (X_i) by means of a function (U), each parameter (X_i) being ordered with an indicator (ij) varying from one to the first number (N₁), the first number (N₁) being an integer that is greater than or equal to ten, the method including at least the following steps:

a1) providing a first score (Ux) associated with a first vector (x) containing first values (x_i) of the parameters (X_i),

b) generating a first set (E1) of lists (L_j), each list (L_j) comprising a second number (N_{2j}) of indicators (ij), the second number (N_{2j}) being an integer that is strictly less than the first number (N₁) and strictly greater than zero,

c) generating, from a list (L_j), of at least a third vector (C_j) wherein each parameter (X_i) has a third value (c_{i,j}),

the third value (c_{i,j}) being equal to the corresponding first value (x_i) when the list (L_j) does not include an indicator (ij) of the corresponding parameter (X_i), and different from the corresponding first value (x_i) in the opposite case;

d) calculating the score (UC_j) of at least one third vector (C_j);

e) evaluating, from the scores (UC_j) calculated for each of the third vectors (C_j), an indicator of significance (R_i) of each parameter (X_i);

f) elaborating, from the evaluated indicators of significance (R_i), an explanation (E) of the first score (Ux),

wherein the first set (E1) comprises a total number (N_t) of lists (L_j), the total number (N_t) being greater than or equal to the square of the first number (N₁),

wherein the method is implemented by a decision explanation system comprising a data processing unit.

2.- A method according to claim 1, wherein the indicators of significance (R_i) calculated during the step e are either Shapley values, or Sobol' indices.

3.- A method according to claim 1 or 2, wherein the total number (N_t) satisfies the following mathematical inequality:

$$N_t \leq Co * 2^{N_1}$$

wherein Co is a predetermined coefficient.

4.- A method according to any one of claims 1 to 3, wherein the step b includes the generating of at least one portion of the lists (L_j) of the first set (E1) in accordance with a probability law (P) pertaining either to the second number (N_{2j}) or to the indicators ij contained in the list (L_j).

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5.- A method according to any one of claims 1 to 3, wherein the step b includes the generation of all the lists (L_j), in which the second number (N_{2j}) is less than or equal to a second predetermined integer (k) that is strictly less than the first number (N_1).

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6.- A method according to any one of claims 1 to 5, wherein the method includes, in addition, a further step a2 of providing a second score (U_y) associated with a second vector (Y) that contains second values (y_i) of the parameters (X_i);

and wherein, during the step c, the third value (c_{ij}) is equal to the corresponding second value (y_i) when the list (L_j) comprises an indicator (ij) of the corresponding parameter (X_i).

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7.- An explanation method for explaining a score (U_x) associated with a vector (X) by means of a function (U), the function (U) having a global maximum (U_g) associated with a first extreme vector (G) and a global minimum (U_b) associated with a second extreme vector (B), the method including:

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g1) the application, from the first score (U_x) and from the global maximum (U_g), of the steps b to e of an explanation method according to claim 6 for obtaining first indicators of significance (R_{g_i});

g2) the application, from the first score (U_x) and from the global minimum (U_b), of the steps b to e of an explanation method according to claim 6 for obtaining second indicators of significance (R_{b_i}); and

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h) generating, from the first (R_{g_i}) and second (R_{b_i}) indicators of significance of an explanation (E) of the first score (U_x),

wherein the method is implemented by a decision explanation system comprising a data processing unit.

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8. A computer program product including software instructions which, when they are executed by a computer, carry out a method according to any one of claims 1 to 7.

9. An information medium on which is stored in memory a computer program product according to claim 8.

10. An explanation system (10) for explaining a function (U) associating a score (Ux) with a vector (x) of a first number (N_1) of parameters (X_i), each parameter (X_i) being ordered with an indicator (ij) varying from one to the first number (N_1), the first number (N_1) being an integer that is greater than or equal to ten, the system (10) being configured for:

- providing a first score (Ux) associated with a first vector (X) containing first values (x_i) of the parameters (X_i),

- generating a first set (E1) of lists (L_j), each list (L_j) comprising a second number (N_{2j}) of indicators (ij), the second number (N_{2j}) being an integer strictly less than the first number (N_1) and strictly greater than zero, the first set (E1) comprising a total number (N_t) of lists (L_j) wherein the total number (N_t) is greater than or equal to the square of the first number (N_1),

- generating, from a list (L_j), at least one third vector (C_j) wherein each parameter (X_i) has a third value ($c_{i,j}$),

the third value ($c_{i,j}$) being equal to the corresponding first value (x_i) when the list (L_j) does not include an indicator (ij) of the corresponding parameter (X_i), and different from the corresponding first value (x_i) in the opposite case,

- calculating the score (UCj) of at least one third vector (C_j),

- evaluating, based on the scores (UCj) calculated for each of the third vectors (C_j), an indicator of significance (R_i) of each parameter (X_i);

- elaborating, from the evaluated indicators of significance (R_i), an explanation (E) of the first score (Ux) .