Algorithm 1 Diabetes diet recommendation mechanism

INPUT:

1. Personal Information (i.e. sex, weight, height, age) and other facts(physical activity, temperature, altitude)
2. Food items and quantity taking upto before dinner
3. Interested for dinner items

OUTPUT: Preference wise dinner menu list and corresponding weighting percentage.

METHODOLOGY

Step 1: Daily required calorie calculation Mechanism

(a) BasicCalorie(sex, weight, height, age)

i. If sex=Male
Output← 66+(13.7×Weight)+(5×Height)-(6.8×Age)

ii. else
Output← 655+(9.6×Weight)+(1.8×Height)-(4.7×Age)

(b) ExtraCalorie(phy. act., temperature, altitude)

i. temp $\leftarrow [0.8, 0.1, 0.1] \cdot [f_1, f_2, f_3]$

ii. Output← $0.3.temp + 1.2$

(c) Total Required Calorie(TRC) ← Basic Calorie · Extra Calorie

Step 2: Nutrition wise partitioning

(a) Required Nutrients in Calorie
RNC← $[0.55, 0.22, 0.27, 0.0144]\cdot$ TRC

(b) Required Nutrients in Gram
RNG← RNC.[0.4,0.4,0.9,1]

Step 3: Knowledge Set(X) construction Mechanism and Checking

(a) Intake Nutrients in Gram
ING←Calculate from input 2 and table 4

(b) Needed Nutrients in Gram
NNG←RNG-ING

(c) X ←NNG/RNG (Component wise)

(d) If some component of X is -ve, then 1st output will show "Patient have taken extra food for these component nutrients"

Step 4: Utility Matrix(U)←Calculated from input 3 and help of table 4

Step 5: Decision taken Mechanism with the help of X and U

(a) Construct fuzzy utility associated $\tilde{U}_i$ for each dinner item

(b) Construct maximizing fuzzy set U_i^{Max} for every dinner item from $S(\tilde{U}_i)$

(c) Using $\wedge$ operator between $\tilde{U}_i$ and U_i^{Max} construct optimal utility fuzzy set $U_i^{optimal}$

(d) Applying $\sum$ operator on $U_i^{optimal}$ finally calculate optimal alternative set $A^{optimal}$ for dinner items

Step 6: According to the membership value of $A^{optimal}$ for dinner items we are ranking the dinner items