

# **African Buffalo Optimization Algorithm for Personalized Diet Optimization and Recommendation**

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Food provides our body energy, vitamins, and other essential nutrients needed by the body to sustain us for our day-to-day activities and to function properly. Since our food choices have an immense effect on our health, a healthy diet helps to maintain a healthy weight, reduces the risk of chronic diseases, enhances body growth, boosts the immune system by preventing diseases and infections, promotes good mental function, enhances body beauty and promotes healthy long life. Hunger and malnutrition are two components connected to poverty and have wrecked most developing countries by disturbing their productive capacity. Malnutrition is a state of under-nutrition or over-nutrition that can lead to one or more Diet Related Diseases (DRDs). DRDs such as obesity, diabetes, cardiovascular diseases, hypoglycaemia, hypothermia, etc., have been reported as causal factor of high morbidity and mortality in many developing countries, and one of the top ten causes of death. According to International Diabetes Federation (IDF), there are about 381.8 million pre-diabetic people in the world as at 2016 and an escalation of 55% to 591.9 million by 2035 was predicted. Usually, people with DRDs depend on expensive life-saving drugs which must be taken as long as they want to exist in the world. Hence, these unhealthy conditions could continue to drain assets of individuals, families, and even nations' economies if left unaddressed. A therapeutic approach for DRDs is close monitoring on the levels of fat and blood sugar levels in the body. This could be achieved by using a combination of proper diet, medications, exercise. Hence, food choice selection remains a typical and effective method of ensuring healthy life as hale diets could sustain balanced body weight, enhanced growth, and boost the immune system necessary to promote good mental function for daily activities. The situation of malnutrition is not just a matter that affects the poor, but also for the rich. According to Food and Agricultural Organization (FAO, 2014), malnutrition is a question of lack of food for the poor, while it is lack of knowledge for the rich. Knowledge includes basic nutrition and application of what to eat. Therefore, a personalized diet optimization and recommendation is a vital area to be investigated when attempting to prevent DRDs and meet nutritional necessities. Parameters such as weight, height, age, blood pressure, blood sugar level, food price were used for the optimization and recommendation. Euclidean distance was used to find food substitutes for food items the user dislikes or is allergic to. African Buffalo Optimization (ABO) algorithm, a robust, efficient and effective algorithm developed from the self-organised African Buffalos, which solves premature convergence problem was used to for the personalized diet optimization and recommendation. As a result of the extensive memory capacity, unusual cooperation and the democratic nature of African Buffalos, ABO provided optimal solutions in less seconds and better execution time when compared to PSO.