

EXPLORING WITH CHATGPT: ALGORITHMS AND YOGAS

Abstract

Human creativity will be enhanced by ChatGPT tools. We explore a context in this direction. Linear Programming is an important method in managerial decision making. There are various algorithms. Bhagavad Gita is an important work dealing with spirituality and decision making. We take a novel approach to compare these two contexts: Algorithms for Linear Programming and Yogas in gita. We consider a human conceived comparison (20 years ago) and how ChatGPT helps to extend this analogy (2023).

Keywords: Human creativity, ChatGPT, Linear Programming, Algorithms

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I. INTRODUCTION

Human creativity is a complex subject. Analogies play an important role. Making meaningful analogies between two different fields is always challenging. It needs exposure to both the two different fields: its structure, its details and its functions.

Here the two different fields are: Algorithms for Linear Programming and yogas suggested in Bhagavad Gita. We present the comparison designed by a human research worker and how ChatGPT helps to extend the comparison.

II. ALGORITHMS FOR LINEAR PROGRAMMING

Linear programming [Solo84] is used for managerial decision making. It finds optimal solutions for a linear objective function subject to linear constraints (decision variables are nonnegative).

The first algorithm was conceived by Dantzig. It is based on the theorem that the optimal point is an extreme point. It is based on search among extreme points. It starts with an extreme point and moves to a neighbouring extreme point with better optimal value. It repeats the procedure until the optimal extreme point is arrived. It was successful in practice. The theoretical property of its worst case behaviour was exponential in the parameters of problem size. With the evolution of complexity theory of algorithms, there was search for algorithms with polynomial worst case behaviour. The Khachian algorithm fulfilled this need. Its conceptual basis was novel use of geometry and counterintuitive way of search from infeasibility to feasibility. But it was not successful in practice. Later Karmarkar introduced an interior point algorithm using projective geometrical ideas that fulfilled both needs : polynomial worst case behaviour and practical success.

III. YOGAS IN BHAGAVAD GITA

In Bhagavad Gita different spiritual paths are considered. There are:

Karma Yoga, Dhyana yoga, Jnana yoga and Bhakti yoga. Here also discussions are made on the question of average case vs. worst case analysis, as in algorithmics.

IV. COMPARISON: YOGAS AND ALGORITHMS

We present a version conceived by a human research worker.

Khachian Algorithm is like

Jnana Yoga in Kali yug.

Theoretically Good.

Practically Not Good.

Understanding of the concept : difficult

Moving from infeasibility to feasibility in the algorithm is like "neti, neti" approach in Jnana yoga

Dantzig's Simplex Algorithm is like
Karma Yoga

Theoretically not best

Practically. Very Good

Understanding of the concept : Easy

"Move from extreme point to a better neighbouring extreme point and repeat till finding the best" is easy to understand.

Similarly in karma yoga

Do your duty without selfish motive.

Do, do.. Till Moksha. It is easy to understand

Karmarkar's algorithm is like

Bhakti yoga:

theoretically Good

Practically very Good

Understanding the concept :

Not easy,not difficult

There are interesting similarities. In Karmarkar's algorithm, it breaks away the need to search a path through extreme points. It starts with an Interior point and constructs a path in the interior feasible region. Bhakti yoga is the inner path.

The Karmarkar algorithm is successful like Bhakti yoga. Such a comparison was reported as a section of doctoral thesis [venk2003]

V. CHATGPT: ALGORITHMS AND YOGAS

I had dialogues on this theme. It presents different features of algorithms and yogas. When asked to make a comparison it made the standard assertion that they are different fields. When I presented a few details of the above comparison and asked to compare, it presented its version.

The prompts were [Prom23]:

What are the different yogas in gita

It presented six yogas (I expected five only)

What are different algorithms for linear programming?

It presented 8 algorithms (i expected 6)

Make a comparison of yogas in gita and algorithms for linear programming.

It will start

Certainly!

It will give a very general polished answer. It will give features of yoga.

It will give features of algorithms.

Give a statement that they are comparable.

But one should give a prompt with one example of comparison of yoga and algorithm, then ask for more comparison.

(the output will vary at different sessions)

A complete session is given below:

Yoga vs Linear Programming

Default (GPT-3.5)

- **User:** Comparing yogas in bhagavad gita and algorithms for linear programming
- **ChatGPT:** The Bhagavad Gita, a 700-verse Hindu scripture, contains teachings on various aspects of life, including spirituality and ethics, but it doesn't specifically address yoga in the sense of physical exercises. Instead, it discusses different paths to spiritual realization, such as Karma Yoga (the path of selfless action), Bhakti Yoga (the path of devotion), Jnana Yoga (the path of knowledge), and Dhyana Yoga (the path of meditation). These paths are more related to the mind and spirit than algorithms.

Linear programming, on the other hand, is a mathematical technique used in optimization and decision-making. It involves creating mathematical models to find the best outcome in a situation with linear relationships, constraints, and objectives. Algorithms for linear programming, like the simplex method and the interior-point method, are computational techniques used to solve these mathematical models efficiently.

In summary, the Bhagavad Gita discusses spiritual paths and ethical principles, while linear programming algorithms are mathematical tools used for optimization problems. They address very different aspects of life and knowledge.

- **User:** Both yogas and algorithms have definite end results. In yoga it is spiritual perfection. In algorithms for linear programming, it is an optimal decision.both have iterative steps. So you can compare.
 - **ChatGPT:** You're right; there are indeed some similarities between the concept of yoga and algorithms for linear programming when viewed from the perspective of iterative processes and achieving specific goals:
1. **Iterative Steps:** Both yoga and linear programming algorithms involve a series of iterative steps. In yoga, one may go through a sequence of practices and self-improvement to attain spiritual perfection. In linear programming algorithms, a series of computational steps are taken to reach an optimal decision.
 - **Goal-Oriented:** Yoga aims for spiritual perfection or self-realisation as its ultimate goal, while linear programming algorithms aim to find the optimal solution to a problem.
 2. **Pathways:** In yoga, different paths like Karma Yoga, Bhakti Yoga, etc., can be compared to different algorithmic approaches used in linear programming, such as the simplex

method or the interior-point method. Each path or algorithm has its own unique way of reaching the desired goal.

- 3. Mind and Body:** Yoga often encompasses both mental and physical practices, aligning the mind and body. In linear programming, there is a combination of mathematical modeling (mind) and computational steps (execution).
- 4. Optimization:** Both yoga and linear programming seek to optimize something – in yoga, it's the self or spirit, and in linear programming, it's an objective function subject to constraints.

While there are these similarities, it's important to note that the ultimate goals and the methods involved in yoga and linear programming are fundamentally different. Yoga is primarily a spiritual and philosophical practice, while linear programming is a mathematical and computational technique for problem-solving. The comparison helps to highlight certain parallels in their iterative and goal-oriented nature, but the underlying purposes and contexts remain distinct.

- **User:** I suggest the simplex algorithm is like karma yoga. Do your duty. Do your duty. You will reach spiritual perfection. In simplex algorithm, go to a neighbour extreme point, with better objective value. Repeat it again and again. You will reach the optimum. Extend this comparison to other yogas and algorithms.
- **ChatGPT:** Your comparison between the simplex algorithm and Karma Yoga is an interesting analogy. Let's explore this comparison further and extend it to other yogas and algorithms:

5. Simplex Algorithm and Karma Yoga

- **Simplex Algorithm:** Like you mentioned, the simplex algorithm iteratively moves to neighboring extreme points with better objective values, much like the idea of doing one's duty (Dharma) repeatedly in Karma Yoga. Both seek improvement through disciplined, systematic efforts.
- **Bhakti Yoga and Genetic Algorithms:**
- **Bhakti Yoga:** Bhakti Yoga is the path of devotion, where one surrenders to a higher power with love and devotion. This can be likened to genetic algorithms in optimization, where solutions evolve over generations through processes like selection, crossover, and mutation, guided by a "fitness" function.
- **Jnana Yoga and Machine Learning:**
- **Jnana Yoga:** Jnana Yoga is the path of knowledge and wisdom. In machine learning, algorithms learn from data to gain knowledge and make informed decisions, akin to the pursuit of knowledge in Jnana Yoga.
- **Dhyana Yoga and Simulated Annealing:**

- **Dhyana Yoga:** Dhyana Yoga focuses on meditation and deep concentration. Simulated annealing is an optimization technique that involves exploring solution spaces with a balance between exploration and exploitation, much like the deep concentration and introspection in Dhyana Yoga.

It's important to note that these comparisons are metaphorical and serve to illustrate similarities in the iterative, disciplined, and goal-oriented nature of these practices and algorithms. However, the ultimate objectives and contexts of these yogas and algorithms remain distinct. Yoga is a spiritual and philosophical pursuit, while algorithms are tools for solving mathematical and computational problems.

VI. CONCLUSION

ChatGPT enhances human creativity, in novel ways. It was explained in the context of comparison of yogas in gita and algorithms for linear programming.

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