Exploring With ChatGPT :Algorithms and Yogas

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 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. We consider a human conceived comparison (20 years ago) and how ChatGPT helps to extend this analogy (2023).

1. 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.

1. 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.

1. Yogas in Bhagvad Gita

In Bhagvad Gita, there are 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.

1. 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

KnowDantzig'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 point. It starts with an Interior point and construct a path in interior feasible region. Bhakti yoga is inner path.

Karmarkar algorithm is sucessful like Bhakti yoga.

Such a comparison was reported as a section of doctoral thesis [venk2003]

1. 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 few details of 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)

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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