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A Panoramic Orchestration For Effective Cultivation Of Fruits In The Indian Subcontinent: PROVENCE

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Abstract: Fruits and vegetables are critical nutritional content of a growing nation like India. Viticulture encompasses produce, greens, spices, condiments, aromatic plants, and plantation crops. India's wide variety of produce includes Mangos, Bananas, Papaya, Coconut, etc. Also, greens typically include cabbage, peas, spinach, etc. Plantation crops consist of rubber, tea, coffee, cashew, etc. Spices are the key ingredients of an Indian diet, including pepper, bay leaf, chilli, cardamom, cinnamon, etc. Viticulture promises many financial gains by offering farm-bred crops that aspire for economic profit. Also, viticulture provides a promise of employment both to the rural population and the urban people, typically through job creation in various phases of the development of horticultural produce. For the Indian economy to prosper, there is a careful need for technological progress, automotive intelligence, enterprise resource management, and knowledge transfer. In this research article, a Process called PROVENCE (Processed Verdant Cadence) applies an algorithm name CANDY (Convoluted Random Forest) which in turn starts a method called PROST (Probabilistic Random Forest) to better the overall horticultural well-being of the Indian subcontinent.

Index Terms **-Viticulture, Produce, Greens, India, PROVENCE, CANDY, PROST.**

I. INTRODUCTION

Horticulture is a field of agriculture that deals with cultivating, storing, and maintaining commodities like fruits, vegetables, spices, aromatic plants, and plantation crops. Fruits and vegetables form a significant component of a healthy diet in the Indian context. Horticultural produce promises nutritional content, overall well-being, and financial gain. Lately, the Government of India has stressed the need for good growth in the horticulture sector with the use of (1) Modern Technology,(2) Adaptable Tools, (3) Accessible Capital, and (4) Extensive arable land. The most effective aspect like (1) Arable area under production, (2) Net yield return on assets,(3) Return on investments, and (4) Capital gains are to be studied when it comes to the horticultural arena.

In this research paper, we propose a new process called PROVENCE. PROVENCE stands for a Processed Verdant Cadence, which typically means applying combinatorics will improve a tree's horticultural wellness. The PROVENCE process will study an algorithm called CANDY (Convoluted Random Forest) to use combinatorics.

Further, the CANDY algorithm will evaluate PROST (Probabilistic Random Forest) to get assistance for convolution, which will lead to combinatorics in a tree to help guarantee excellent horticultural wellness.

II. RELATED WORKS

The scientists (Ananda, T., Prathap, G. (2020)) discuss the generation and optimality of viticulture produce in India and the south India. Produce and greens are the constituents of 90% of the agricultural output of India. The net production of viticulture during 2020 is roughly one per cent more than the 2017-2018 period.

The geographical region under viticulture increased by nearly 1 per cent. India has a large amount of output of popular produce and greens like mango, citrus fruits, potato, cashew, etc. The harvesting occurs in multiple seasons. The desire for an abundant and well-diversified viticulture output was identified in the mid-eighties by the Government of India.

Viticulture has enhanced the Indian economy by leading productivity, generating employment, and through outbound produce exports. Information harvesting is essential for an abundant crop yield. Information is necessary for prices, fresh arrivals, and exogenous populations. Recently, India has witnessed reasonable growth in the total viticulture output. In the last ten years, the area under cultivation has increased by 3 per cent per annum while the net production has risen by around 5%. In 2017-2018 the net viticulture output was ~ 320 million tonnes from a geographical region of 26 million hectares. The net production of greens has increased from ~ 100 million tonnes to ~ 190 million tonnes in the last decade. Also, the production of products has increased from 51 million tonnes to 98 million tonnes.

The authors (Mitra, A., Panda, S. (2020)) describe viticulture and economic growth in India with a financial analysis. India's viticulture output has seen consistent growth in the last twenty years, and the country is now second in rank only to China when it comes to net viticulture output. This research article aims to evaluate the brief and detailed relationship between economic development and viticulture output in aggregate. The data set spanned from 2001 to 2018, encompassing the Gross Domestic Product (GDP) and peripheral data on viticulture output. The econometric objects utilized were Granger Logical Apparatus, Johansen Cohabitation Tool, and specific models. Johansen Cohabitation tools displayed a keen relationship between the attributes. The Segment Anomaly Correction model and its likelihood results helped signify no visible correlation between various characteristics other than that between the GDP and viticulture production levels. Granger's Logical Apparatus displayed a weak relation between the three attributes. The review ascertained a straight-line relationship between GDP and viticulture output as ascribed and single variables.

The scholar (Kumar, B. (2022)) explores the gains in the viticulture sector in India while outlining fashion and prospects. It is a reasonable concern that the viticulture sector can get increases in agricultural value while promising job assurance and the generation of forex. For these policies to bear fruit, contrived measure variations are essential. There has been a growth of around 20% in the '90s and an increase of roughly 10% in the decade of 2010. Between 2000 and 2010, produce accounted for ~20% of agricultural output, with an annual percentage growth of ~4%. Cash crops are making their mark in the viticulture sector. Various states compete healthily for their share in the yield of produce and greens. The critical facets are research and development for growth in productivity, a net rise in cash crop production, chasing an efficient frontier, and gains in facilities like inventory stores and logistics. Also, intensive farming is essential delicately, as small holdings can work alongside significant assets to ensure a symbiotic Diaspora.

In a study, the investigator (Choudhary, S. K. (2021)) constructs a survey on viticulture evolution in India and describes the futuristic measures. The viticulture sector envelopes various crops like spices, tuber, ayurvedic and aromatherapy, produce, greens, and extensive crops. In the first few Mahalanobi's five-year plans, it was quintessential to cater to the needs of the Indian population in agriculture while providing self-sufficiency in farming. Lately, viticulture has emerged as an apex arena where produce, greens, and cash crops offer a way to diversify agricultural production. At the same time, viticulture helps provide much-needed input to the food services industry and generates ample employment.

The scientists (Gupta, D., Madhuchhanda (2022)) work towards development in fashion and experiment on the latent talent in viticulture in Northeast India. The Northeastern part of India is home to a diverse and vibrant ecosystem which leads to opportunities for the growth of a large variety of moderate and sub-tropical viticulture crops. Produce, greens, and condiments from this region are high in wholesomeness and

have an excellent overall presence in India and the world markets. This research article is a trial at evaluating the potential of viticulture in Northeast India. From peripheral data, they assessed Aggregate Yearly Growths and Desirability Scale. The result shows that there is low chaos in the production of produce and greens, while there is a moderate amount of confusion in the production of spices. Through business-oriented decision-making, the viticulture output of Northeast India has more potential. Produce and condiments from this region find a market in India's Gulf and neighbouring countries. To experience a renaissance in viticulture in the area, facilities planning, modernization, and enterprise resources are essential.

The author (Kaul, G. L. (1997)) briefs the reader on viticulture in India – its generation, sales, and processing. Viticulture includes produce, greens, cash crops, and plantation crops, including cashew, condiments and aromatherapy plants, and botanical flowers. India has a sizeable agricultural output in the viticulture domain due to a large arable area, tropical climate, soil fertility, good biological variety, and a solid history of botanical cultivation. Also, a wide variety of viticultural species resulting from intensive and extensive planning lead to tantalizing culinary recipes.

The scholars (Ajitha, A., Vasudevan, T. M. (2018))) suggest fashion in viticulture research works in the Indian subcontinent through scientific analysis. This research article covers fashion in viticulture in India from 2010-2020. It emphasizes the annual spread, readership matches, collaborative teamwork, article-wise frequencies, journal impact factor, and the ranking of India amongst its neighbouring countries. The information evaluated from scientific sources represents a compilation of approximately 1500 records. The review documents a variational trend in the increase in recorded documents within that period. The most significant number of data items was in the year 2016. The papers have multiple authors. The measure of teamwork is 90%. The Latest Science journal is a crucial role player in the viticulture literature arena. India is ranked very high as per the total number of publications in viticulture by any country.

The researchers (Das, M., Singh, A. K. (2021)) investigate the role of viticulture and nutrients as two facets of a coin. According to a Professor of agriculture, viticulture holds the secrets to well-being and good health. Viticulture plays a crucial role in building the economy of a country. Produce and greens are a significant percentage of the total output of an agricultural nation.

The various schemes within viticulture are (1) High net output, (2) Increased returns per arable area,(3) High utility of fallow land,(4) Promise of ingredients for agro-industries, (5) Generation of employment in rural and urban areas,(6) Empowering a nation (7) Botanical cultivation (8) Care and nurturing of seeds and,(9) Floral harmony. Viticulture also sustains women's livelihoods in the rural area by offering financial relief.

The team of scholars (Singh, H. P., Malhotra, S. K. (2013)) offers an analysis of viticulture for cuisine, well-being, and Medicare while looking at job security. In the current economic scenario, food, wellness, health care, and means of livelihood are acquiring primary importance. Food production has grown in a good measure primarily through viticulture. Grain levels rose fivefold, viticulture eight folds, lactose sixfold, and pisciculture nine folds in 2010 compared to 1950. A nation can stand on its feet when citizens can access clean and nutritious diets that offer goodness and well-being. Viticulture pursuits can provide an excellent means of nutrition to the populace while at the same time sustaining productivity in the farms. From a cereal-based diet, the population in India has migrated to produce-based food habits, and the major contributing factor has been an increase in per capita income. It shows that the viticulture sector holds a large amount of promise for the diversification of the agricultural output of India.

The scientists (Kadam, M. M., Rathod, V. J., Phalke, S. H. (2015)) discuss the net increase and performance of viticulture in India. India has a rich biodiversity and excellent soil condition along with favourable climatic conditions, which make it suitable for viticulture crops like (1) Tuber crops like potatoes, (2) Spices, (3) Aromatic Plants, and (4) Plantation crops like (a) Cashew, (b) Rubber, (c) Tea and (d) Coffee.

The latest in technology involves the usage of (1) Automated planting,(2) Mechanized harvesting,(3) Drip Irrigation,(4) Machine winnowing,(5) Intensive Fertilization,(6) Nutrient management and (7) Culturing and Sustenance.

Viticulture has moved from the confines of a rural economy to the urban landscape, thus attracting youth with its promises of financial gains. The following are the critical points in viticulture.

1. Studies of viticulture and related crop
2. Review of arable area
3. Analysis of technological know-how
4. Capital investment

Fruit production has increased around nine times from the 1950s to the 2010s. Onion and mango have shown sustained growth rates in exhibitions.

III. METHODOLOGY

A specific tree called a Provence tree is initialized. The tree is a binary tree with a root, then two children, then four children (of a level above), eight children, 16 children, and finally 32 leaf nodes. The tree has 32 leaves as leaf nodes.

Also, the tree has eight fruits at level 4. Here's an example of a Provence tree.

Printing provence tree (level wise)

```
                                46
                              40, 48
                          40, 49, 47, 44
                  40, 50, 44, 45, 48, 42, 50, 48
    48, 42, 48, 41, 40, 43, 40, 46, 42, 44, 44, 48, 45, 49, 41, 49
41 , 49 , 50 , 45 , 46 , 47 , 48 , 47 , 40 , 43 , 40 , 44 , 40 , 50 ,
48 , 42 , 48 , 50 , 40 , 50 , 49 , 45 , 42 , 50 , 47 , 43 , 46 , 43 ,
49 , 48 , 44 , 49
```

A Candy is a convolution random forest of 10 elements. Here's a sample candy from a test run

Printing candy

```
2, 1, 4, 2, 5, 5, 5, 3, 5, 5
```

A Prost is a probabilistic forest that evaluates from the corresponding Candy.

The algorithm for calculating a prost is as follows

1. Create a convolution array of 8 values
    a. The values in the convolution are created by multiplying two adjacent numbers in Candy
2. Now multiply each Candy element by the Sine of the convolution number.

Here's an example of a Prost from a sample run

Printing prost

```
1.8185948536513634,      0.9893582466233818,      0.5294070003910921,
1.3005756803142337,      3.740124765396412,       2.7201055544468487,
0.6617587504888651, 1.9508635204713505
```

Now update the Candy data structure with the Prost values by following this sequence of steps.

1. Sum up the values in the Prost. Let's call it S
2. Take $1/10^{th}$ power of the sum of values (S). Let's call it OneTenthS
3. Multiply each element of Candy by OneTenthS

Now update the Provence Tree with the Prost Data Structure as follows

1. For each of the eight fruits at level 4, take the absolute difference between the children of the node (at level 5, there will be 16 such children); let's call it LevelOneDiff
2. Now subtract a Prost value from LevelOneDiff and call it LevelTwoDiff
3. Add LevelTwoDiff to Fruit Values

Here's the resulting tree after one iteration.

Printing provence tree (level wise)

46

40, 48

40, 49, 47, 44

41.390000429104205 , 50.94468536926587 , 47.114245902455934 , 46.468850326001046 , 48.9482817926822 , 46.01938021562296 , 54.39280737806992 , 49.20327548900157

48, 42, 48, 41, 40, 43, 40, 46, 42, 44, 44, 48, 45, 49, 41, 49

41 , 49 , 50 , 45 , 46 , 47 , 48 , 47 , 40 , 43 , 40 , 44 , 40 , 50 , 48 , 42 , 48 , 50, 40 , 50 , 49 , 45 , 42 , 50 , 47 , 43 , 46 , 43 , 49 , 48 , 44 , 49

The horticultural wellness of a Provence tree is defined by the following algorithm:

1. Take a numerator as a sum of all the level 4 nodes (8 nodes in total)
2. Take a denominator as the sum of all the leaf nodes (32 nodes in total)
3. Divide the numerator by the denominator to get the horticultural wellness

Here's a horticultural value after 1 iteration of the PROVENCE algorithm

Calculating horticultural wellness

Horticultural wellness: 0.2628148142780517

The exit condition for the iterations ensures the algorithm exits with a good result.

IV. RESULTS AND DISCUSSION

Here's the output of a sample run of the PROVENCE Algorithm

Printing horticultural values

0.2508544087491456
0.2628148142780517
0.27239179695353655
0.30040118198135046
0.32967444494069426
0.3948755150726827
0.5187787635927759
0.7034219904879125
0.9349351322232525

The following plot shows a graph of the horticultural wellness values evaluated over nine iterations of the PROVENCE Algorithm.

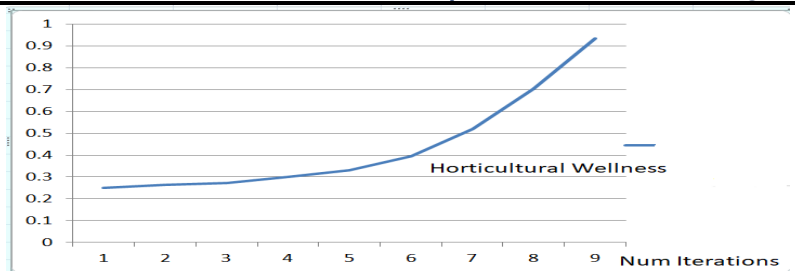

Fig 1. Horticultural wellness

The PROVENCE algorithm seems to be iterating and refining the value of the horticultural wellness of a Provence Tree. It is observed that the initial horticultural value is in the range of 0.2 – 0.3The final horticultural value (the one that meets the exit criteria) seems to be in the range of 1.0 – 3.0
The numbers from the PROVENCE algorithm seem to be good, as observed in Fig 1. It appears that the horticultural wellness of a Provence tree is steadily increasing and then finally reaches a stable value (the one that meets the exit criterion).

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