

Retraction

Retracted: Development of Microbiology Plantation-Based Multimodal Segmentation for Smart Garden Using Machine Learning

Advances in Materials Science and Engineering

Received 26 December 2023; Accepted 26 December 2023; Published 29 December 2023

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This article has been retracted by Hindawi, as publisher, following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of systematic manipulation of the publication and peer-review process. We cannot, therefore, vouch for the reliability or integrity of this article.

Please note that this notice is intended solely to alert readers that the peer-review process of this article has been compromised.

Wiley and Hindawi regret that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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- [1] S. Prasath, R. Govindaraj, R. Subbiah et al., “Development of Microbiology Plantation-Based Multimodal Segmentation for Smart Garden Using Machine Learning,” *Advances in Materials Science and Engineering*, vol. 2022, Article ID 1066535, 6 pages, 2022.

Research Article

Development of Microbiology Plantation-Based Multimodal Segmentation for Smart Garden Using Machine Learning

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Received 1 June 2022; Revised 13 June 2022; Accepted 14 June 2022; Published 5 October 2022

Academic Editor: K. Raja

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Normally, gardens lower the ambient temperature, which would improve air quality, absorb pollutants, and produce oxygen. Trees reduce soil erosion, increase fertility, and help retain soil moisture. Decomposed leaves that fall in the garden become nutrients for tree growth and help microbes to thrive. When it comes to growing trees in a garden, one should try and choose native trees that are naturally found in a particular area. These trees are well adapted to the environment and require less maintenance. Many insects and birds rely on native trees for food and shelter. Therefore, they are best for the environment. However, not all native trees are evergreen trees. Many evergreen trees can be planted in a small garden. In this paper, a microplantation-based model was developed to enhance the biological impacts for a smart garden. Based on the garden requirements, the smart system was constructed. On this basis, the seeds are planted in the soil.

1. Introduction

Plants in narrow beds get the nutrients they need from a bed filled with organic matter. Although the area between the beds does not “walk,” if it is covered with mulch or turf, it helps to keep the base and ground moist. The mulch layer is processed into earthworm fertilizers and soil microorganisms. In addition, weeds, sawdust, and straw will not grow in those buried in the sand. In order not to waste energy in creating new beds every year, they are made stable, and they are protected by any available materials, logs, boards, bricks, slate, and stones. Augmenting or painting with water-based paint is the best

pretreatment to protect wood products against decay [1]. If you have a dry hot climate, the amount of soil in the garden should not exceed the ground level between rows, and if the weather is rainy or watering the gardens, it makes sense to make beds/boxes. In beds raised above the ground level, boxes during prolonged rains, the plants do not get wet and hot. The walls of the beds/boxes rise to a height of 20–30 cm above the ground level, and it is better to make them durable and practical bricks, for example, durable materials than boards or logs [2]. The leaves are placed at the very bottom of the straw or hay box, and thin branches can be used, which are covered with compost or humus from above, and then, at the very top, fertile soil.

To maintain fertility in the beds, you can add compost to them or grow green manure, which can be sown in early spring and autumn.

Organic gardening should be considered as an alternative to intensive horticulture, which often uses unnecessarily high amounts of fertilizers and pesticides. Of course, the yield of a serious type of a garden will be higher [3]. The practice of organic farming refers to the use of only natural fertilizers in the garden, manure, compost, leaf humus, and other organic matter, as well as wood ash. In the fight against diseases, the application of the most important principle of crop rotation has a positive effect. Attracting these insect-eating birds and beneficial insects to the garden helps to combat them. Weed control is not done with the help of herbicides, but through efficient agronomic practices, mulching, and proper crop rotation. We must remember that taking care of creation and arrangement of the garden is the key to success which is a respectful approach to the earth. It should be noted that this is not "dirty" in any way, as some people think. Soil is a habitat for organisms, microorganisms, protozoa, fungi, and soil animals. It is a complex biological system, a pantry of mineral and organic components, from which plants gain the strength to harvest [4]. With proper handling, the soil can maintain fertility spontaneously.

In narrow beds, tall and spreading plants that need more space are grown in two rows in the form of a checkerboard (cabbage, eggplant, peppers, tomatoes, and small ones that do not interfere with each other) and three or four rows, taking into account the distance between them (onions, garlic, carrots, peas, beets, lettuce, and others). For better and more uniform lighting, it is worth noting that all the beds are stretched from north to south, so that when the sun rises, it illuminates one side of the plants before lunch and the afternoon before sunset [5]. Also, do not forget to combine several types of garden crops in one garden bed, for example, root crops at the center, tall, short, and at the edges. On normal beds, and even in the middle of densely planted vegetable crops, they get sick and often rot. Plants grow poorly, give small fruits, and are stored for a short time. Such beds are difficult to process and weed. In addition, insects feed on weak plants and breed in such areas [6]. The plants in the outer rows are much healthier than the ones in the middle. So, you need to make narrow beds so that they are easy to process. If you combine the two technologies, narrow beds and the agricultural technology of landscaping, you can get a harvest. This is business, learn how to make your own compost and arrange short fixed beds only once. Also, instead of mineral fertilizers, use humus, grass, manure, and ash, which spoil the taste of the fruit and make it unnatural, in short, organic fertilizers. At the same time, we note, however, that mineral fertilizer is not a poison, but it is good in reasonable amounts. The plants should be fed but not overfed [7].

Combined planting of vegetables not only makes full use of the available land but also positively affects the growth and yield of both plants. Such beds are very beautiful from the outside [8]. Smart garden planning and plant interaction combine many of the nuances that scientists and farmers have explored in their own experience. Many plants release chemical compounds that stimulate and suppress the growth of neighbors. In addition, they protect each other from heat,

provide shade, enrich the soil, and prevent the growth of weeds that are dangerous to another species or repel pests. Each culture has its own list of useful and harmful companions in the garden [9]. Mixed plantings perform a number of functions: protecting plants from diseases and pests, increasing yield per unit area, protecting the soil from unilateral deficiencies, and reducing weed numbers. Fruits and vegetables grown in the community with other species are tasty: mint enhances the taste of potatoes; parsley enhances the taste of tomatoes [6]. If you choose the right plants, they will help each other and make the owner happy. This is the best use of your land. I have been using compression and joint plantings of crops in my garden for a long time. I sow the carrots in a row with the onions, the beds with the cabbage with the salt, and the potatoes with the beans. Also, nursery plants such as calendula, marigold, and nasturtium grow throughout the garden.

2. Literature Review

The decreased fertile soil layer leads to problems caused by chronic crop failures, pests, and plant diseases. Soil fertility depends directly on the presence of humus in it, the main soil component, and its organic area, which is formed as a result of biochemical changes in animal and plant residues. It is in the humus combined with the minerals of the soil that all the essential nutrients of the plant world are found [5]. The soil formation process takes place with the help of saprophyte microorganisms, symbiotic fungi, and soil organisms. Causes of soil depletion are unfortunately a person interferes very unexpectedly with the complex processes that take place at the boundaries of the upper soil [10]. Continuous digging violates the microbial balance of the soil. Unfair use of pesticides kills all living things, including beneficial soil plants and animals. Continued use of mineral fertilizers leads to soil salinity, due to which the plants, in the end, are unable to obtain nutrients. Pollution and depletion of the soil leads to nothing growing on the site except weeds. It is well known that organic fertilizers integrate well into the food chain of soil-dwelling microorganisms, while providing all the nutrients to plants [11]. It takes a lot of effort to hurt. Practically, no excess washes away by excessive weather and rainfall. Therefore, the use of organic matter at all stages of crop cultivation is becoming more and more desirable. The basic techniques of organic farming, i.e., actually creating the land, fall under three main techniques: composting, application of green manure, and mulching [12]. To drop mineral fertilizers or minimize their use, it is necessary to use organic materials. Fertilizers and manures contain all the essential elements necessary for the normal growth of plants, nitrogen, potassium, phosphorus, and magnesium [13]. Bird droppings, peat, and bone meal can be used successfully as organic fertilizers in natural agriculture. Wood ash has always been an excellent source of trace elements. All types of organic fertilizers are safe for humans and soil microorganisms [14]. Organic fertilizers include compost, manure, humus, bird droppings, and more. Our ancestors had no manure except for furnace ash and dung. This universal fertilizer not only improves yield but also improves soil structure and fertility, which has been used in agriculture since ancient times [15].

3. Proposed Model

The proposed multimodal segmentation technique (MMST) constructs natural agriculture. The beds are not just straight rows with beautiful borders. To organize them properly, you need to do a little work. Perhaps, this position of working with the land is the most time consuming but not comparable to the efforts used to dig or plow which is shown in Figure 1 that shows the MMST warm bed preparation model.

First of all, it is necessary to mark the site for the beds for the width of the planting area and create the right paths, row spacing. They should be wide. Of course, not everyone is ready to go to the consumption of such “economical” land; the paths are 60–80 cm wide, and the beds themselves range from 45 to 50. But still, increasing the spacing between plantings to at least 50 cm will allow the gardener to provide more light to the plants, which will positively affect the general condition of the crop during the growing season and increase yields.

Second, the beds should be prepared in advance: not on the day of sowing the plant but in the fall. To do this, you can use several methods. Immediately after harvest, it is necessary to sow the ridges with green manure and do not remove them from the surface until spring. At this time, they will be completely warmed up, or the first layer of mulch, however, very thin, should be further increased after planting. Refueling beds with organic matter is the process of creating warm beds. For this, the fur is due to a depth of at least 40 cm, and this is the only occasion when you need to pick up a shovel when arranging a garden. Next, the branches, organic matter, and fresh grass are laid in layers of soil, after which the bed is covered with a mulch cloth. The focused area of the MMST is shown in Figure 2.

3.1. Intensive Cultivation. The arable land layer, excessive drilling, loosening, mineralization, and other agricultural work will lead to higher material costs with more labor and less efficiency. Natural farming on a farm or garden leads to minimal costs, while allowing for a good harvest each year.

3.2. Mulch. It is an important method for improving the soil quality and creating favorable conditions for the natural system. Mulch protects straw, sawdust, straw, fallen leaves, roots, and cut weeds, all covering the beds from above, from excessive evaporation of black soil moisture, erosion, and hypothermia.

3.3. Fair Top Coat. It is designed to process beneficial microorganisms, fungi, that use organic matter, multiply them, suppress pathogenic bacteria, and repair mineral components, all that can act as natural humus (Algorithm 1).

This is it. Now, we do not have to touch it until spring. In the first year of operation, we plant melons, cucumbers, and tomatoes. We are increasing the utilization of beds while using the crop rotation concept. Such an organic bed will work effectively for 3-4 years. When organic matter is

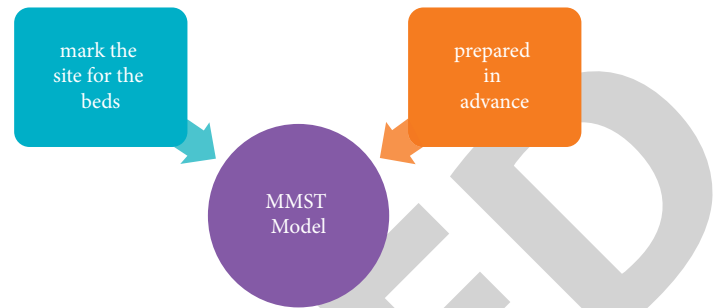


FIGURE 1: MMST warm bed preparation model.

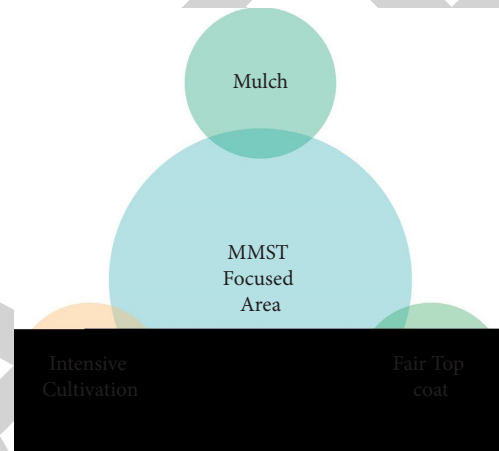


FIGURE 2: MMST focused area.

introduced in the spring, soil is added to the planting holes so that the plants do not burn under the influence of temperature, which increases as a result of overheating of the organic layers:

- (i) Waste, foliage, grass, and plant debris should be regularly filled. After harvesting the vegetables, it is better to sow the beds. When planting seedlings in holes, no rotten manure or compost is introduced into them. The bed itself is compost.
- (ii) Fences do not allow washing with humus. Thanks to the large aisles, vegetable crops get enough air and light. Beds are easy to water, and water does not stagnate.
- (iii) Organic and mineral fertilizers are used sparingly. If the bed is mulched, mulching and weeding will disappear.
- (iv) Short beds are not dug but only loosened to a depth of 7 to 10 cm. In the spring, they warm up faster, so they can be planted earlier. Crop rotation is also convenient; last year, onions were grown, and this year, carrots and cabbage are sown. The tubers and roots of the vegetables are clean without any symptoms.
- (v) It is convenient to set the arches above the beds. They are sold in specialty horticultural stores. It is only necessary to drive in two pegs on both sides at a distance of 1 m and place on curves. So, they do the

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(1) Start
(2) Initialize the requirements
(3) Check the available requirements details
(4) If (requirements= available)
(5) Then check if (garden parameter= available)
(6) Then send the details to garden manager
(7) Wait for approval
(8) Assign the requirements for utilization
(9) Else
(10) Then send the details to the audit manager
(11) Waiting for approval from the garden manager
(12) Provide the license audit manager
(13) End.

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ALGORITHM 1: Multimodal segmentation technique (MMST).

full length of the box. You can cover with foil from the frost.

The construction of standard beds has several important advantages, which are a hundred times justified:

- (i) Reducing the cultivated area of the soil
- (ii) Beauty and order on site, no dirt in aisles
- (iii) Such beds are very convenient for plowing and maintenance
- (iv) It is not necessary to make new beds every year
- (v) Irrigation facilities and low water consumption
- (vi) Nutrients are not washed away from the fenced garden
- (vii) A high bed prevents flooding and stagnant water
- (viii) The bed has a large enough amount of useful ingredients and moisture
- (ix) The mulched bed will retain moisture and weed growth
- (x) The absence of weeds in the wide aisles eliminates the need to fight them, thanks to the mulch of large gardens
- (xi) Fixed fertilization is not required, and sowing green manure replenishes the nutrients in the bed soil
- (xii) No need to dig into an organic bed, only loosening with flat cutting tools
- (xiii) The rapid warming of the raised bed in the spring allows for early planting
- (xiv) A narrow bed and wide aisles provide not only plants with good light but also free movement of the air, which increases the air supply of plants and prevents the development of fungal diseases during wet periods
- (xv) Raised narrow beds make it easy to hide from spring and autumn frosts or pull sun protection nets in hot summers

4. Results and Discussion

The proposed multimodal segmentation technique (MMST) was compared with the existing cognitive model for emotion awareness (CMEA), commuter behavior profiling framework (CBPF), PTZ-surveillance coverage (PTZSC), and the scalable data clustering technique (SDCT).

4.1. Mulched Soil Management. Organic mulch complements the soil of the site well with minerals necessary for plant growth and improves its composition, promoting the reproduction of earthworms and other soil organisms which is elaborated in Table 1.

In mulched soil, the content of vermicompost gradually increases. Covered soil is protected from overheating in the sun and, accordingly, from rapid evaporation of moisture, humidity, and erosion. Straw, leaves, sawdust, straw, and many others are suitable as mulch.

4.2. Crop Rotation Management. Crop rotation, or simply speaking, transplanting and changing crops, helps maintain soil fertility and significantly reduces the number of diseases and pests. Not all annual crops grow in the same place for the second year in a row, and this is a simple crop rotation plan. Complex systems include ten-year rotation patterns of vegetable and fruit crops which is elaborated in Table 2.

It can do crop rotation according to one of two principles: alternative families or groups of crops (leaf, fruit, and root) with a minimum shift plan (usually three to four years).

4.3. Warm Bed Management. Beds made directly in the compost pile, even hotter, during the decomposition of organic matter, heat is released. The temperature of the heated bed is two to four degrees higher than the ambient temperature. This makes it possible to plant the plants in advance. Direct composting of beds with raw organic matter offers several benefits which are elaborated in Table 3.

TABLE 1: Comparison of mulched soil management.

No. of inputs	CMEA	CBPF	PTZSC	SDCT	MMST
200	47.84	59.13	41.90	45.80	84.05
400	47.51	57.63	41.31	43.93	83.04
600	46.17	56.52	40.33	43.10	82.88
800	45.03	56.14	39.12	42.19	81.92
1000	43.98	55.13	37.98	41.27	82.35
1200	43.27	54.20	36.87	39.94	81.15
1400	41.97	53.20	36.17	38.86	80.99

TABLE 2: Comparison of crop rotation management.

No. of inputs	CMEA	CBPF	PTZSC	SDCT	MMST
200	50.14	61.43	38.50	43.06	84.96
400	49.81	59.93	37.91	41.19	83.92
600	48.47	58.82	36.93	40.36	83.79
800	47.33	58.44	35.72	39.45	82.83
1000	46.28	57.43	34.58	38.53	83.26
1200	45.57	56.50	33.47	37.20	82.02
1400	44.27	55.50	32.77	36.33	81.91

TABLE 3: Comparison of warm bed management.

No. of inputs	CMEA	CBPF	PTZSC	SDCT	MMST
200	47.09	40.42	44.42	38.03	83.27
400	48.72	42.16	46.00	39.45	84.56
600	49.20	44.50	48.20	40.71	85.57
800	50.49	45.31	49.83	42.70	86.46
1000	52.60	47.60	50.97	45.17	86.83
1200	54.09	49.53	53.17	46.61	87.87
1400	55.90	51.26	54.32	48.33	88.64

TABLE 4: Comparison of plant nutrition management.

No. of inputs	CMEA	CBPF	PTZSC	SDCT	MMST
200	48.88	69.17	46.06	51.50	85.22
400	47.25	67.43	44.48	50.08	83.93
600	46.77	65.09	42.28	48.82	82.92
800	45.48	64.28	40.65	46.83	82.03
1000	43.37	61.99	39.51	44.36	81.66
1200	41.88	60.06	37.31	42.92	80.62
1400	40.07	58.33	36.16	41.20	79.85

4.4. *Natural Agro Management.* The organic farming system is based on a basic study that defines the earth as a living thing, a creature that can completely destroy the soil ecosystem that a person has created over the centuries. As a result, the earth will cease to produce what it can, even if it is not for human action which is shown in Table 4.

4.5. *Plant Nutrition Management.* Because of the hysteria on the soil, we have become accustomed to considering plant nutrients as minerals, and somehow, they lost sight of the atmosphere. But plants with all the leaves live in it. To understand what plants eat, one must consider what they are made of. Plants are 50% carbon, which is obtained in the form of carbon dioxide through the leaves which is shown in Table 5.

TABLE 5: Comparison of plant nutrition management.

No. of inputs	CMEA	CBPF	PTZSC	SDCT	MMST
200	50.26	68.70	48.41	54.69	85.06
400	50.37	68.68	48.58	54.96	85.56
600	50.39	67.80	47.85	54.66	85.44
800	47.29	64.97	44.51	51.15	82.21
1000	46.09	63.65	43.78	49.83	81.83
1200	45.48	62.82	42.89	49.29	81.26
1400	45.07	62.42	42.81	48.99	81.56

TABLE 6: Comparison of soil microorganism management.

No. of inputs	CMEA	CBPF	PTZSC	SDCT	MMST
200	55.43	58.22	47.58	54.73	82.44
400	55.76	59.72	48.17	56.60	83.45
600	57.10	60.83	49.15	57.43	83.61
800	58.24	61.21	50.36	58.34	84.57
1000	59.29	62.22	51.50	59.26	84.14
1200	60.00	63.15	52.61	60.59	85.34
1400	61.30	64.15	53.31	61.67	85.50

TABLE 7: Comparison of insect protector management.

No. of inputs	CMEA	CBPF	PTZSC	SDCT	MMST
200	53.13	55.92	50.98	57.47	81.53
400	53.46	57.42	51.57	59.34	82.57
600	54.80	58.53	52.55	60.17	82.70
800	55.94	58.91	53.76	61.08	83.66
1000	56.99	59.92	54.90	62.00	83.23
1200	57.70	60.85	56.01	63.33	84.47
1400	59.00	61.85	56.71	64.20	84.58

Microbes breathe it in and break down organic matter. Plants take 20% of their oxygen and 8% of their hydrogen from water and air. Plants find only 15% of nitrogen in the soil due to microbial activity. Only 7% of the mineral elements were intended to extract from the Earth's crust, so they had to put in a lot of effort to build soil. Therefore, plant nutrition in the strict sense is nitrogen and carbohydrate.

4.6. *Soil Microorganism Management.* The main thing is the soil microorganism. There are 4% of soil microorganisms which are hundreds of species. We are interested in the most specific ones: conservationists and soil developers. They are constantly being discovered and studied. Therefore, let us take into account that the known microorganisms are only a small part of the overall picture, which cannot be fully established. Germs do not die which is shown in Table 6.

Once in a bad condition, they grow up and become spores or are immediately eaten by other microorganisms. Good ones multiply. Therefore, it is not possible to consume large amounts of microbial products. Another thing is that there is no point in increasing the dose if the effect from this does not increase.

4.7. *Insect Protector Management.* Many plants repel or attract insects or animals that eat vegetable crops. They can be attached to plantings with vulnerable plants or planted

between rows for preventive purposes which is shown in Table 7.

If you do it right, you can significantly reduce the use of chemicals in the garden or eliminate them altogether. Different crops help to protect the garden from such pests.

5. Conclusion

- (i) In general, when planning garden beds, it is important to consider the compatibility of vegetable crops.
- (ii) With no preconditions for this, gardeners often had to deal with the problem of low yields. And, the reason may be trivial, an uncomfortable environment, so you need to know what can happen and what should not. When landing, taking into account compatibility, it is very realistic to help increase the yield further.
- (iii) Particular attention should be paid to the selection of the neighbor when placing different types of vegetables in the same bed or in a greenhouse.
- (iv) The proposed multimodal segmentation technique (MMST) was compared with the existing cognitive model for emotion awareness (CMEA), commuter behavior profiling framework (CBPF), PTZ-surveillance coverage (PTZSC), and the scalable data clustering technique (SDCT).
- (v) The proper placement of plants in beds affects their yield more than they appear. Some crops grow well when grown together, while others, on the contrary, interfere with each other.

Data Availability

The data used to support the findings of this study are included within the article. Further data or information sets are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Acknowledgments

The authors appreciate the supports from Mettu University, Ethiopia, for the research and preparation of the manuscript. This project was supported by Researchers Supporting Project number (RSP-2022/283) King Saud University, Riyadh, Saudi Arabia.

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