

Recommendations For Web-Based System Analysis Using Hybrid On The Website Hydroponic

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1. INTRODUCTION

1.1 Background

Indonesia has a diversity of crops normally used for farming, especially in the agricultural sphere. At this time a lot of vegetable crops cultivated by the people of Indonesia. However, along development of information technology and the increasing number of human birth, causing the more dense residential areas so that the reduction in land or land to meet human needs, especially the need for food in urban areas. Current information technology plays an important role into the living part of urban society, with the flurry of activity by the mostly urban communities better utilize his gadget to be able to access whatever, indefinitely because it is faster and easier to get information. So that the use of technology also play a role in the life of the utilization of farming with hydroponics system method. Hydroponic systems can be used as an alternative to the fulfillment of food production easily, where the climatic conditions are sometimes not easy to guess because often experience erratic transition, and elements in the soil properties often lose nutrients. So hydroponic be the ideal solution for solving the above problems ..

hydroponic cultivation technique has been widely used by farmers in Indonesia, especially for growing vegetables. Cultivation of plants hydroponically has several advantages such as: (1) does not require a large area and treatment more practical and thus require less labor, (2) to use fertilizers more efficiently, (3) the plant grow more rapidly and success is assured, (4) planting can be done continuously without depending on the season, (5) can be scheduled so that harvesting can produce crops continuously, and (6) the selling price is more expensive hydroponic vegetables (Lingga, 2005). Hydroponics is the cultivation of plants using water as raw material to support the growth of these plants. For a plant good growth hence the need for adequate nutrition needs. The nutrients can be mixed into the water so that the spread of nutrients to be evenly distributed and easily for dissolved. In addition to nutritional factors that can affect the growth of the well can also be affected by the *EC* (*Electro Conductifity*), pH, and temperature environment. All three of these factors can be detected by the sensor, the sensor is controlled by a *microcontroller* Arduino Uno. Microcontroller function to input signals from the sensors enter the EC, pH, and temperature and then the microcontroller to process the input to generate output results. In the hydroponic system has a model in the planting system that is one which will focus on the study authors used a model NFT (*Nutrient Film Technique*). NFT (*Nutrient Film Technique*) is a model of hydroponic cultivation with plant roots lay in a shallow layer of water. To be circulated water and nutrients needed by plants. Rooting can thrive in the nutrient solution. Because there rooting around the layer of nutrient solution, then the system is known by the name of *the movie nutrient technique* (NFT) (Lingga, 2011). Planting hydroponics has aspects that must be considered such as the type of plant, ambient temperature, ph, nutrients that are suitable for use and EC (*Electro Conductifity*)these aspects should be in accordance with the plant whatever, which is suitable to be planted simultaneously when viewed from the EC, pH, temperature , Hence the need for recommendation systems.

System recommendation in this study using *Recommendation Based Hybrid System*. A recommendation system is an application to provide and recommend an item to make a decision that is desired by the user (Ungkawa, et al., 2013). Implementation of recommendations in a system usually make predictions for an item, such as the recommendation movies, music, books, news and other things that attract *users*. The system is run by collecting data from *the user* directly or indirectly (Fadlil & Mahmudy, 2010).while *Based Hybrid Recommendation System* it is a combination of both approaches collaborative and content-based approach. With the help of Hybrid Recommendation

problems can be easily overcome such problems could give a recommendation in accordance with the wishes of the choice and *user* can be handled using hybrid recommendation.

For that I am interested to analyze the methods used to analyze each section and *outputs* produced.

Based on the description above, the writer gave the title "**Recommendations For Web-Based System Analysis Using Hybrid On The Website Hydroponics**".

2. Theoretical

2.1 Literature

To support this study, the researchers took several sources of previous similar studies in lakunan by previous researchers on the system of recommendation with a hybrid method, and about hydroponics.

2.1.1 Research conducted by Kaustubh Kulkarni, Keshav Wagh, Swapnil Badgujar, and Jijnasa Patil on "*A Study of Recommender Systems With Hybrid Collaborative Filtering*". Recommender System is example of software personalization. Concerns personalization by adapting to the individual needs, interests and preferences of each user. That includes: Recommend (for example, shows a list), *Filtering* (for example, *e-mail* filter), Predict (For example, a tourist product).

There are two types of technical recommendations and the personal recommendations on non-private system. There are three basic approaches to a personal recommendation at the algorithmic level.

a. The first is *content-based* filtering, *content-based filtering* member user characteristic affinity for certain features (content, metadata) on the items they like. Filtering is done basic attributes of the item. Machine learning algorithms are used to induce the user preference profile of sample based on the description content features. There are various other classification technology under this area to decide whether the item is applicable to the user.

b. The second is *collaborative* filtering. It looks for the same purchase patterns among users. It maintains database of user ratings of various items. For certain users, he found other similar users who rank highly correlated with the assessment of the current user. Then recommend items rated high by the users alike. There are two variations to this technique, user to user collaborative filtering and item to item collaborative filtering.

c. The third is approach a *hybrid filtering* of this is a combination of both *content-based filtering* and *collaborative filtering* to benefit from both the filtering based on content as well as *filtering*. collaborative

2.1.2 Research is next undertaken by Jaimeel Shah and Lokesh Sahu, entitled "A Survey of Various Hybrid based Recommendation Method" recommendation system is filtering information that applies data analysis techniques to the problem of helping customers find the products they want to buy to produce a score of similarity predicted or a list of recommended products for specific customers. system recommender works of certain types of technical information filtering system that tries to recommend items of information (movies, TV programs / shows / episodes, music, books, news, images, web pages, scientific literature etc.) or social element (age, people, events or group) which may be of interest to the user.

In the hybrid recommendation is a combination of both approaches collaborative and *content-based*.

The approach used to classify the hybrid approach is as follows:

a. Combining separate proposer. In this method to implement the recommendations we should implement a hybrid collaborative and content Then after method, we can combine the output (rank) obtained from good recommendation system using a linear combination of assessment or voting scheme. For example: Daily Learner Systems.

b. Adding characteristic for content-based collaborative model. This type is used to address the problem of spar city. To resolve the issue in this case approaching the similarity between two users is calculated between the profile-based content and items of similar profile, but also indirectly, when this item scores highly against against the user profile.

c. Add characteristics to a model-based collaborative content. The most popular approach is to use some dimension reduction technique on a group of content-based profiles. For example it uses latent semantic index (LSI) to create collaborative display a collection of user profiles, which

profiles the user is represented by a vector term, result in improved performance. Compared with a pure content-based approach.

- d. Developing a model of a single unifying recommendation. Many researchers have followed this approach now days. For example, one approach proposes to use the content-based and collaborative characteristics (age or gender of the user or a genre film) in a classification based on a single rule.
- e. Another approach is to propose a unified probabilistic method for combining collaborative and content-based recommendation, which is based on probabilistic latent semantic analysis. Yet another approach is proposed, where Bayesian mixed-effects regression models were used which uses Markov chain Monte Carlo methods for parameter estimation and prediction.
1. Further research done by Dr. Amit Verma, and Harpreet Kaur Virk in 2015 entitled "A Hybrid Recommender System for Performance Improvement Using Personal propensity" mutation and the standard deviation is the main component used in this paper, the system is evaluated using various parameters such as precision and recall.

2.1.3 Research conducted by Devi Sugianti in 2012 entitled "Algorithms Nearest Neighbor for Determining Area Product Marketing Batik Pekalongan" *Nearest Neighbor* is the approach to looking for a case to calculate the closeness between the new cases with old cases, which is based on matching the weight of a number of features which exists. Suppose it is desirable to find a solution to a new patient using the solution from the previous patient. To find a case where the patient who will use the calculated closeness new patient cases with all cases of old patients. The case of older patients with the greatest proximity of the one who will take the solution to be used in case of a new patient (Kusrini, Taufiq Emha Luthfi.2009).

3. Results Analysis And Discussion

3.1 Result

3.1.1 Flow General Hydroponics Website:

Website hydroponics authors observe is a website that has been built that www.hidroponik.ubl.ac.id Indonesian *Urban Agriculture Technology* or so-called verture. Verture it self is a tool for controlling the automatic provision of nutrition for all kinds of hydroponic plants. These tools not only automate nutrition with the right dose, which can monitor plants improper nutrition. Verture provide the best solutions for the future and affordable agriculture.

Here is the groove on the hydroponics website:

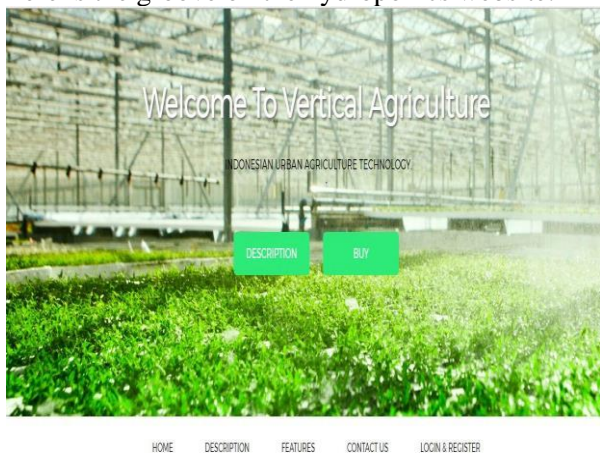


Figure 1 Main Menu page

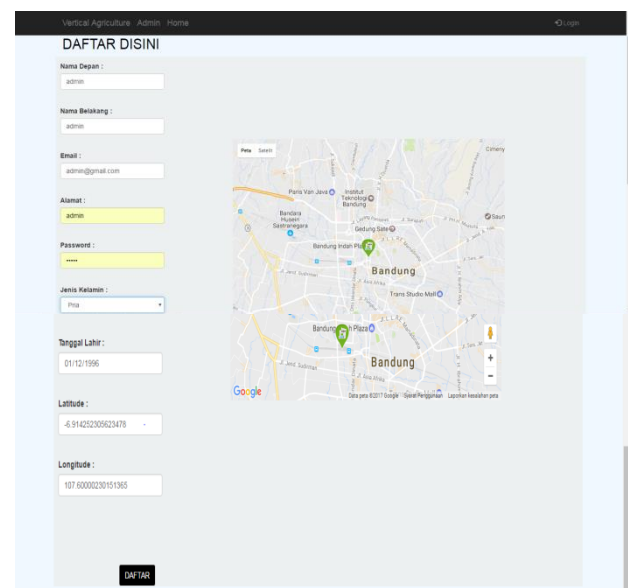


Figure 2 Login And User Register

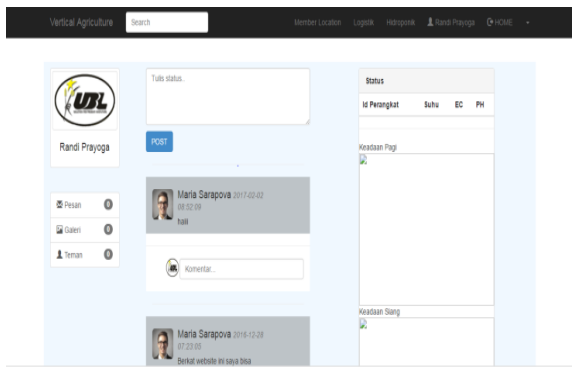


Figure 3. Menu After Login

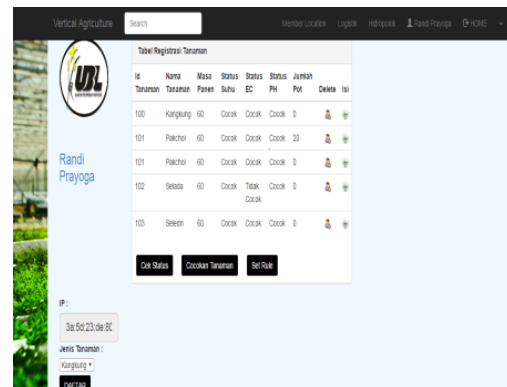


Figure 4 Menu Home To User

Pictured above is a menu on the website of hydroponics can be accessed from the user to register the plant that the user select or want, which consists of Id plant, the plant's name, age harvest, temperature status, status of EC, pH, total pot, *delete* to remove the plant from the registration list of plant, fill to fill the pot number the user wants to be planted.

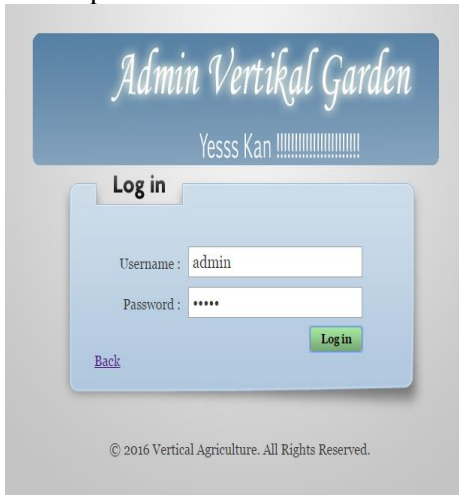


Figure 5 Menu Login Admin

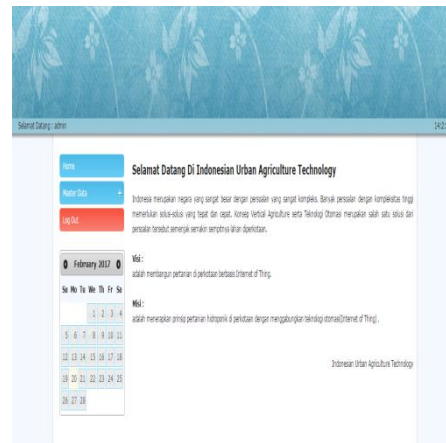


Figure 6 Menu Home For Admin

On the main page of the admin, admin can process master data that contains the master plant, master knowledge, and user data.



Figure 7 Menu Master Plants

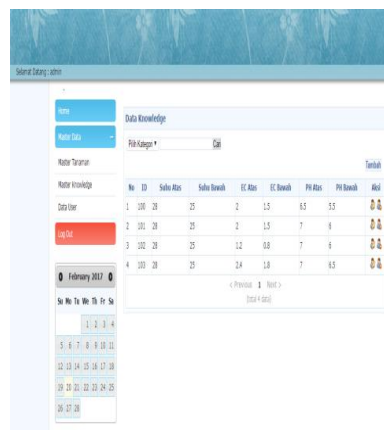


Figure 8 Menu Master Knowledge

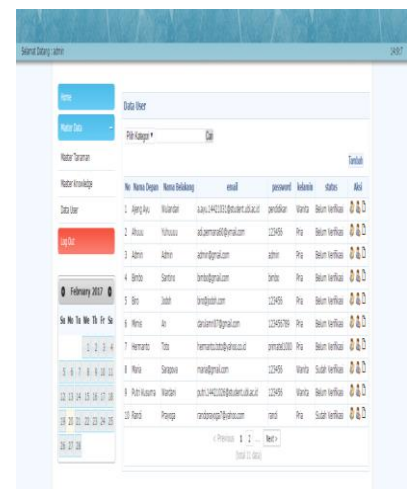


Figure 9 Menu Master Data User

3.2 Analysis Problems On Website Hydroponic

On the website hydroponics user can select the types of plants that the user wants, but there are still limitations menu on the web which causes the user difficulty in choosing the type of plants according to the user for selection of plant species that do not vary and is not a recommendation to the user. So that users who visit the website had difficulty when opening a web page main menu offered no recommendations to the user, as the user requires the choice of the recommendations as they wish. With the problems it is Hydroponic website *Indonesian Vertical Agriculture* require new solutions to complete. A recommendation system is one solution to the problems often faced by the user. By holding this recommendation system it is expected that the system can help the user in selecting the types of plants with different recommendations as a potential indicator of the harvest faster, pH, EC, and the appropriate temperature so that plants grow well and good.

3.2.1 Block Diagram

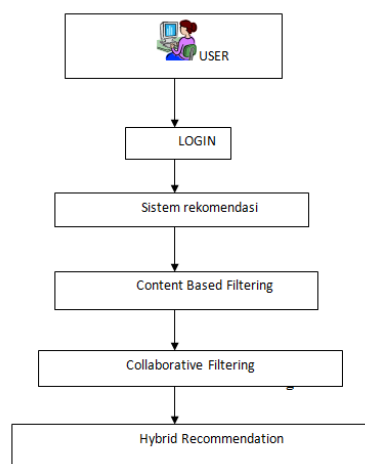


Figure 10 Block Diagram

Based on the block diagram that the system to be built *users* can use traditional system by login the user will enter the menu system on there *the user* can select the type of crop they want, by selecting the menu system on it will easily admin gain user data with the taking of the history data *user* for just do it the analysis of activity *user* on the website so plant species anywhere that *users* click or open and he was a member *rating* on these plants so that decision making will then be easy to get the data to do *content-based* filtering, *Collaborate* filtering, Then after getting a rating by the user to match the item can be retrieved by method. *a hybrid* By the way the calculation

3.3 Discussion

In the discussion this time the author uses the example of the problem so that he gets on the right with a hybrid method algorithm *Nearest Neighbor* with approach. *Similliarly* Closeness value ranging from 0 to 1. A value of 0 means that the two cases are not similar absolute, and a value of 1 means the case is similar to the absolute. To perform calculations using *Nearest Neighbor* on this system, eg in a database, there are 6 *users* choose plant species recommendations based on the preferences as follows: In determining the recommendation on this system using three attributes:

1. type of vegetable crops
2. Aspects
3. Harvest Potential

Table 1. Determining

No.	Types of plants	Aspect	Potential Harvest
1	Pakchoi	Temperature	Fast
2	Lettuce	EC	Medium
3	Celery	pH	Slow

Table 2. Weighting Attributes

Attributes	Weight
Type Plants	0.6
Aspects	0.3
Potential Harvest	1

Table 3. Weighting Proximity attribute value plant species

Plant Type	Pakchoi	Lettuce	Celery
Pakchoi	1	0.6	0.6
Lettuce	0.6	1	0.6
Celery	0.6	0.6	1

Table 4. The closeness of the value of the attribute type of plant

value 1	value 2	Proximity
Pakchoi	lettuce	0.6
Pakchoi	Pakchoi	1
Lettuce	lettuce	1
Celery	Pakchoi	0.6
Pakchoi	Celery	0.6
Pakchoi	Pakchoi	1

Table 5. Proximity attribute value aspects

Aspect	temperatures	EC	pH
Temperature	1	0.3	0.3
EC	0.3	1	0.3
pH	0.3	0.3	1

Table 6. Proximity attribute value aspect

value 1	value 2	Proximity
Temperature	pH	0.3
Temperature	EC	0.3
temperature	temperature	1
EC	EC	1
	pH	1
Ph	temperature	0.3

Table 7. Proximity attribute value potential harvest

potential harvest	Fast	Medium	Slow
Dialing	1	0.6	0
Medium	0.6	1	0.6
Slow	0	0.6	1

Table 8. The closeness of the potential harvest value attribute

value 1	value 2	Proximity
Fast	Fast	1
Medium	Fast	0.6
Fast	Fast	1
Cepat	Quick	1
Slow	Quick	0

Medium	Slow	0.6
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Table 9. Cases that have been there

No.	The species of	Aspect	Potential plant
1	Pakchoy	Temperature	Fast
2	Pakchoy	pH	Quick
3	Lettuce	EC	Medium
4	Celery	Temperature	Slow
5	Lettuce	pH	Slow
6	Pakchoy	pH	Medium

Suppose would recommend to *user* thewith characteristics as follows:

Types of plants: Pakchoi
aspect: temperature

Potential harvest: Quick

so to predict whether the recommendation is suitable or not it can be done with the following steps:

1. Count the proximity of new cases with case No. 1.

Know::

a. proximity to the attribute type of plant (Pakchoi with Pakchoi):1:

b. the weight attribute types of plants:0.6:

c. proximity to attribute aspects (temperature with temperature):1:

d. Weight attribute aspects:0.3:

e. proximity to the attributes of potential harvest (quick quickly):1:

f. Weight of the attributes of potential harvest:1

Calculated Distance proximity:

$$\text{distance} = (a * b) + (c * d) + (e + f) b + d + f$$

$$\text{distance} = (1 * 0.6) + (1 * 0.3) + (1 * 1) 0.6 + 0.3 + 1$$

$$\text{distance} = 1$$

1. Calculated proximity of new cases with case no. 2

Know::

a. Proximity to the attribute type of plant (Pakchoi with Pakchoi):1:

b. Weight attribute types of plants:0.6:

c. Proximity to attribute aspects (Temperature pH):0.3:

d. Weight attribute aspects:0.3:

e. Proximity to the attributes of potential harvest (fast with fast):1:

f. Weight of the attributes of potential harvest:1

Calculated Distance proximity:

$$\text{Distance} = (a * b) + (c * d) + (e + f) b + d + f$$

$$\text{Distance} = (1 * 0.6) + (0.3 * 0.3) + (1 * 1) 0.6 + 0.3 + 1$$

$$\text{Distance} = 1.691.9$$

Distance = 0.89

1. Calculating new cases with case no. 3

Given::

- a. Proximity to the attribute type of plant (Pakchoi with lettuce):0.6:
- b. Weight attribute types of plants:0.6:
- c. Proximity to attribute aspects (Temperature with EC):0.3:
- d. Weight attribute aspects:0.3:
- e. Proximity to the attributes of potential harvest (fast with fast):0.6:
- f. Weight of the attributes of potential harvest:1

Calculated Distance proximity:

$$\text{Distance} = (a * b) + (c * d) + (e + f) b + d + f$$

$$\text{Distance} = (0.6 * 0.6) + (0.3 * 0.3) + (0.6 * 1) 0.6 + 0.3 + 1$$

$$\text{Distance} = 0:55$$

1. Calculate new cases with case no. 4

Given::

- a. Proximity to the attribute type of plant (Pakchoi with Celery):0.6:
- b. Weight attribute types of plants:0.6:
- c. Proximity to attribute aspects (Temperature with Temperature):1:
- d. Weight attribute aspects:0.3:
- e. Proximity to the attributes of potential harvest (fast with slow):0:
- f. Weight of the attributes of potential harvest:1

Calculated Distance proximity:

$$\text{Distance} = (a * b) + (c * d) + (e + f) b + d + f$$

$$\text{Distance} = (0.6 * 0.6) + (1 * 0.3) + (0 * 1) 0.6 + 0.3 + 1$$

$$\text{Distance} = 0:34$$

1. Calculate new cases with case no. 5

Given::

- a. Proximity to the attribute type of plant (Pakchoi with lettuce):0.6:
- b. Weight attribute types of plants:0.6:
- c. Proximity to attribute aspects (Temperature pH):0.3:
- d. Weight attribute aspects:0.3:
- e. Proximity to the attributes of potential harvest (fast with slow):0:
- f. Weight of the attributes of potential harvest:1

Calculated Distance proximity:

$$\text{Distance} = (a * b) + (c * d) + (e + f) b + d + f$$

$$\text{Distance} = (0.6 * 0.6) + (0.3 * 0.3) + (0 * 1) 0.6 + 0.3 + 1$$

$$\text{Distance} = 0.24$$

1. Calculate new cases with case no. 6

Given::

a. Proximity to the attribute type of plant (Pakchoi with Pakchoi):1:

b. Weight attribute types of plants:0.6:

c. Proximity to attribute aspects (Temperature pH):0.3:

d. Weight attribute aspects:0.3:

e. Proximity to the attributes of potential harvest (fast with Average):0.6

f. : Weight of the attributes of potential harvest:1

Calculated Distance proximity:

$$\text{Distance} = (a * b) + (c * d) + (e + f) b + d + f$$

$$\text{Distance} = (1 * 0.6) + (0.3 * 0.3) + (0.6 * 1) 0.6 + 0.3 + 1$$

$$\text{distance} = 0.68$$

From steps 1-6 have known that the highest value contained in one user at a distance of 1, which means that the user 1 has similarity with the new user, so that the recommendation *user 1* can be recommended to the user new from the above data it would have taken the highest value of proximity 3 user 1, user 2, and *user 6*. Based on the proximity of the above it will be used as data history on the type of plants that are often in search *user* and then in the search results by using rating *collaborative filtering*.

4. Conclusions And Recommendations

4.1 Conclusions

Based on the analysis and discussion of the hydroponic system on the website using a hybrid method, then a number of conclusions as follows:

1. Based algorithm *Nearest Neighbor calculations*, the system can provide recommendations on the website hydroponic plant species.
2. Web-based recommendation system on its website hydroponics can allow a user to obtain information about the plants that can be accessed anywhere and anytime.

4.2 Recommendations

1. On the web recommendation system needs to be built with the addition of comprehensive features.
2. In the writer has not implemented testing *Beta*(questionnaire) which is in reference scientific journals.
3. To further study the data attributes needed to be more diverse, and the data used to seek recommendations shall be many.

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