AGRICULTURE EQUIPMENT RENTAL AND SELLING SYSTEM

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Abstract

Agriculture forms the backbone of Indian economy and there is always a need of supporting and improving it .As a part of which some of Indian NGO's are with an initiative of supporting the farmers by facilitating them with the modern agricultural equipment's on rental basis .Modern agricultural equipment's make farmers work more efficient and easy .As a part of which there are some organizations that are set up to help those farmers who are in need of such equipment's ,where the organization owns the equipment's and rent those on request of farmers at liable amounts. At present, farmers need to travel to a place to borrow all the essential needs, which is a tiresome and not a cost effective work. So a smart digital farming is listed as the highest ranking technology opportunity in the latest Global Opportunity report in terms of its expected positive impact on society. This paper is on digitizing the process of renting the agricultural equipments by the farmers .We aim at developing an application that farmers can use to get their equipments on rent and also check the availability and renting .We also allow them to book the equipments in advance .It also helps us to get the track of equipments that are on rent .We also aim at developing analytic for the state heads to make better availability of equipments and to keep track of the equipments as well, which could help in providing better support for farmers.

Agricultural machinery rental is a new service form that uses big data in agriculture to improve the utilization rate of agricultural machinery and promote the development of the agricultural economy. To realize agricultural machinery scheduling optimization in cloud services, a dynamic artificial bee-ant colony algorithm (DABAA) is proposed to solve the above problem. First, to improve the practicability of the mathematical model in agricultural production, a dynamic coefficient is proposed. Then the mutation operation is combined with the artificial bee colony (ABC) algorithm to improve the algorithm. Then, iterative threshold adjustment and optimal fusion point evaluation are used to combine the ABC algorithm with the ant colony optimization (ACO) algorithm, which not only improves the search precision but also improves the running speed. Finally, two groups of comparison experiments are carried out, and the results show that the DABAA can obviously improve the running speed and accuracy of cloud services in agricultural machinery rental.

Keywords: agricultural machinery; rental optimization; big data; cloud service; artificial bee colony (ABC); ant colony optimization (ACO)

Introduction

Indian agribusiness is experiencing a slow move from reliance on human power and creature capacity to mechanical power on the grounds that expanding cost for upkeep of creature and developing shortage of human labour .Indian farming is experiencing a progressive move from reliance on human power and creature capacity to mechanical power in light of the fact that expanding cost for upkeep of creature and developing shortage of human work. Along these lines there is a solid requirement for taking homestead automation .So, we are digitizing the agriculture equipments by the farmers. The objectives this paper are:

- We aim at developing an application that farmers can use to get their equipment's on rent and also check the availability.
- It reduces the cost of visiting the nodal centres to check the availability and renting.
- We also allow them to book the equipment's in advance.
- It also helps us to get the track of equipment's that are on rent
- We also aim at developing analytic for the state heads to make better availability of equipment's an to keep track of the equipment's as well which could help in providing better support for farmers

The weak purchasing power of agricultural machinery is China's current condition, and the cost of large agricultural machinery is very high. Due to the small size of farmland and strong seasonal characteristics of crops in China, it is difficult for farmers who have bought agricultural machinery in a short time to make profits. Agricultural machinery idles for a long time, which is a waste of resources. In addition, the function of Chinese agricultural machinery is singular, and many different types of agricultural machinery are needed in the production of a crop. The role of a single type of agricultural machinery is extremely limited, so farmers are extremely unwise to buy large agricultural machinery. Agricultural machinery rental is a new service form that can lighten the burden of buying agricultural machinery. This service improves the utilization rate of agricultural machinery and promotes the development of the agricultural economy. However, most agricultural machinery rental companies are still in the stage of immediate deployment. Staff only considers the time sequence when the agricultural machinery is deployed, so the efficiency is low in the busy season and the needs of farmers are difficult to meet. With the rise of network technology and vigorous development, digital technology has permeated all areas. Big data is starting to be used in agriculture, and cloud services are becoming more popular with agribusinesses. Agricultural machinery rental services have also been combined with big data. Many local small agricultural machinery rental enterprises have started to develop cloud platforms in China. However, considering the traveling salesman problem and scheduling method, it is still difficult to achieve large-scale agricultural machinery scheduling.

At present, there is little research on agricultural machinery scheduling. Luo et al. proposed a modified fuzzy hybrid genetic algorithm for agricultural machinery scheduling, but it is limited to genetic algorithms. To achieve an optimal schedule for sequential agricultural operations, Edwards et al. used a tabu search method for exploration and verification, but its scope of application is relatively small. Therefore, large-scale agricultural machinery scheduling needs to be developed. With the development of artificial intelligence algorithms, various intelligent algorithms have been widely used in various optimization problems, such as genetic algorithms, ACO algorithms , particle swarm optimization, ABC algorithms and firefly algorithms. Kumar et al. proposed a generalized ant colony optimizer algorithm to solve the cloud resource allocation problem. proposed multi-objective task scheduling optimizationto find the optimal solution , which solved the optimization problem well. Cao et al. proposed a depth optimization analysis method based on the algorithm . Zhou et al. realized the optimization and application of agricultural machinery rental in cloud manufacturing services based on the reliability feedback update strategy and the dynamic coefficient strategy . All the above studies on solving problems with artificial intelligence algorithms have achieved good results, but there are few applications in agriculture. Artificial intelligence algorithms are introduced in agricultural machinery rental optimization by using agricultural big data, so a DABAA is proposed in this paper. First, to enhance the accuracy of the mathematical model, a dynamic coefficient is added to the Quality of Service evaluation model. Then, to further improve the global search capability, the mutation operation is added to the ABC algorithm. Additionally, to combine ABC with the max-min ant system, a method capable of iterative threshold adjustment and optimal fusion evaluation is adopted. Finally, to verify the convergence of the DABAA, this paper proves that the algorithm has good performance through experimental simulations and theoretical derivation.

Proposed System

The proposed system is a Modern agricultural equipment's make farmers work more efficient and easy .As a part of which there are some organizations that are set up to help those farmers who are in need of such equipment's, where the organization owns the equipment's and rent those on request of farmers at liable amounts .At present, farmers need to travel to a place to borrow all the essential needs, which is a tiresome and not a cost effective work. So a smart digital farming is listed as the highest ranking technology opportunity in the latest Global Opportunity report in terms of its expected positive impact on society.Agriculture yet forms the backbone of Indian economy and there is always a need of supporting and improving it.
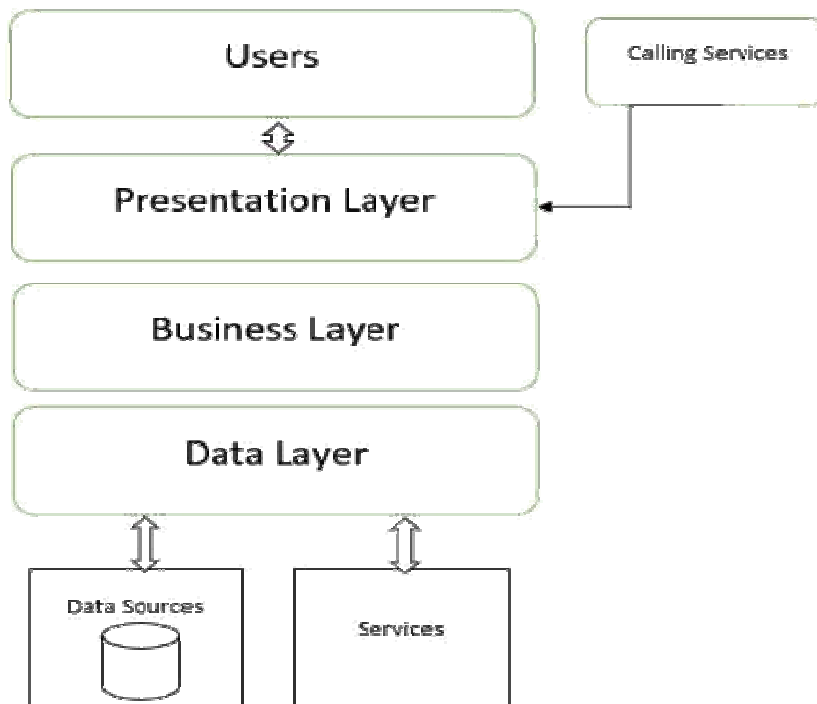
Mobile application architecture

Application engineering is a lot of advancements and models for the improvement of completely organized portable projects dependent on industry and merchant explicit gauges. As you build up the design of your application, you likewise consider programs that deal with remote gadgets, for example, cell phones and tablets. Mobile app architecture design usually consists of multiple layers, including:
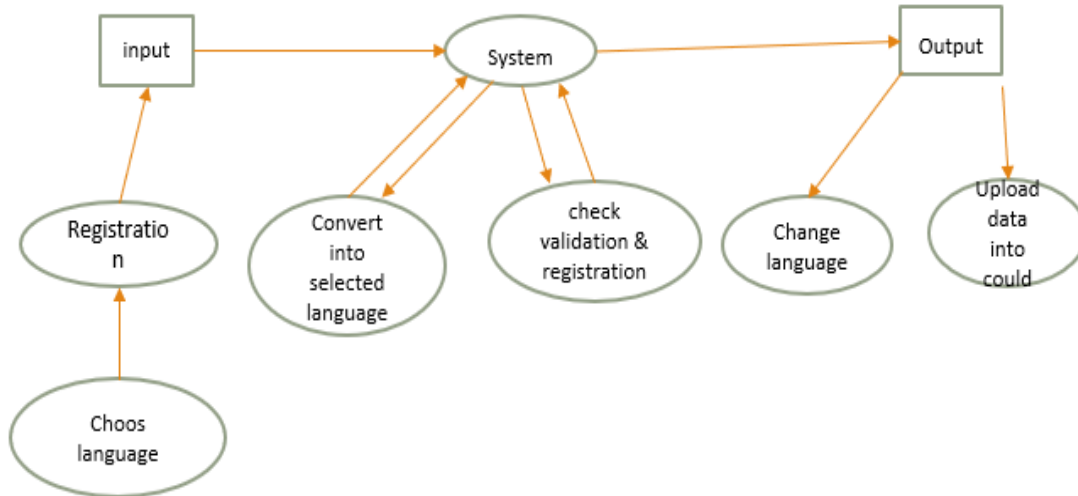
Presentation Layer - contains UI components as well as the components processing them.

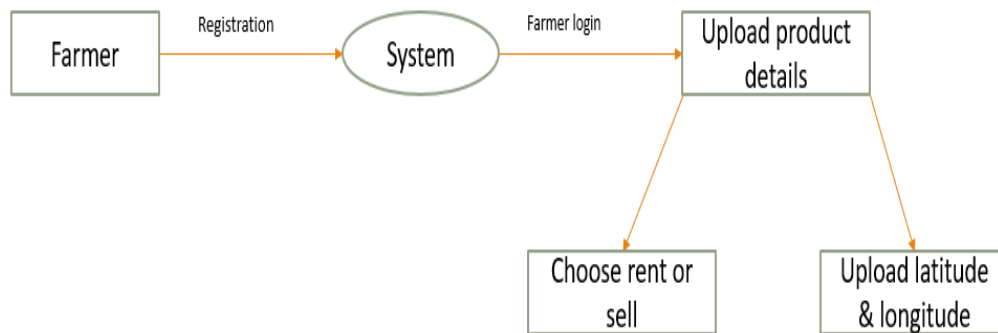Business Layer - composed of workflows, business entities and components.

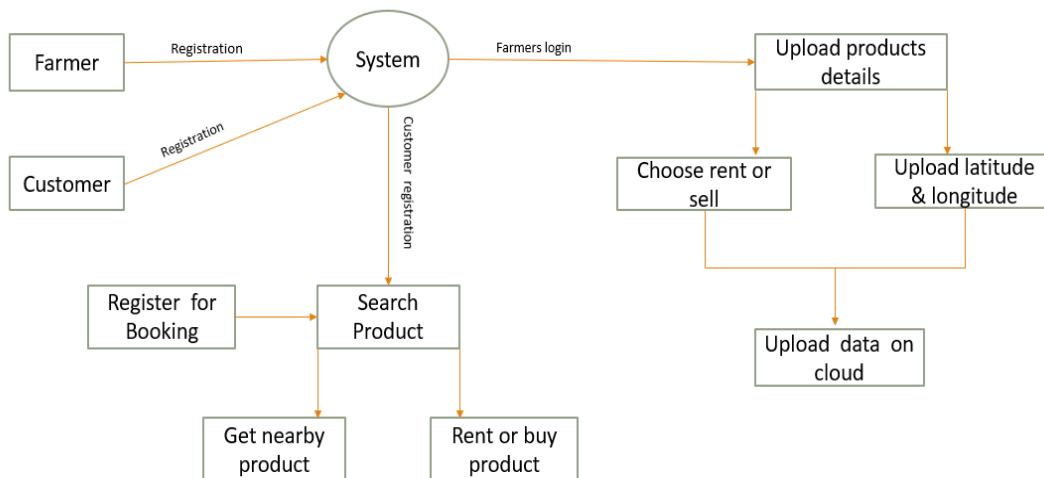Data layer - comprises data utilities, data access components and service agents.
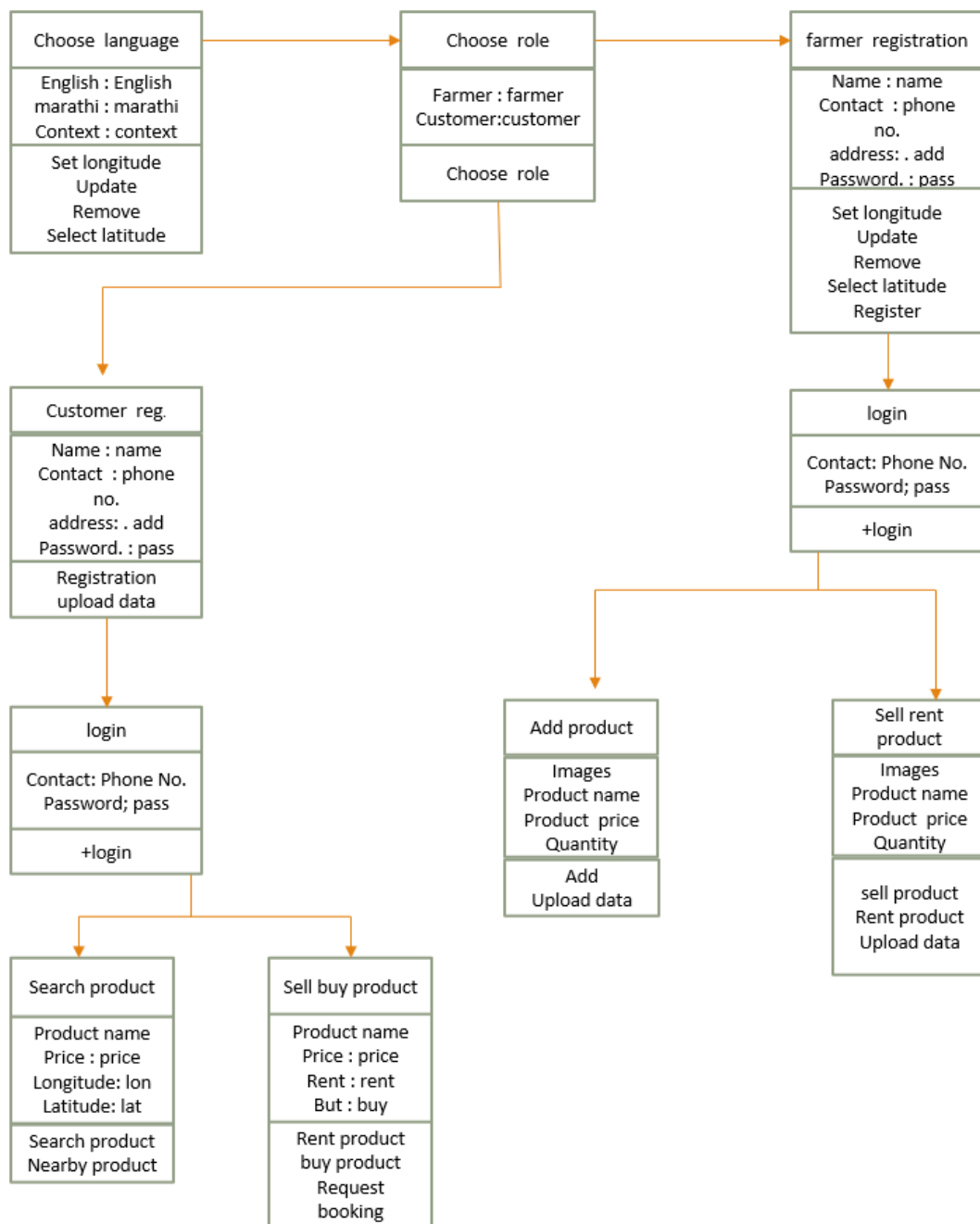

Mobile application architecture

Data Flow Level 0

Data Flow Level 1

Data Flow Level2

Choose language
English : English marathi : marathi Context : context
Set longitude Update Remove Select latitude

Choose role
Farmer : farmer Customer:customer
Choose role

farmer registration
Name : name Contact : phone no. address: . add Password. : pass
Set longitude Update Remove Select latitude Register

Customer reg.
Name : name Contact : phone no. address: . add Password. : pass
Registration upload data

login
Contact: Phone No. Password; pass
+login

login
Contact: Phone No. Password; pass
+login

Add product
Images Product name Product price Quantity
Add Upload data

Sell rent product
Images Product name Product price Quantity
sell product Rent product Upload data

Search product
Product name Price : price Longitude: lon Latitude: lat
Search product Nearby product

Sell buy product
Product name Price : price Rent : rent But : buy
Rent product buy product Request booking

Class Diagram

Future Scope

The online administration framework for Agri-Equiment rental framework was made to guarantee the productive task and straightforward administration of a government-upheld farming hardware rental business

It reduces the manual work.It reduces the paper work, thus supporting the sustainable environment. It saves time also.Moreover, the proper documentation of whole project is also provided so that any-one can understand the project and can do the necessary changes if required. This application can be improved in many ways and can be extended to support multiple devices. Following are some of the possible extensions:

Analytics can be extended in such a way that State head can view, in which region which machinery is required and move to that location in prior.Inclusion of crops and fertilizers to the list.Inclusion of GPS and maps which can help in identifying the current locomotion state of the equipment.

Conclusion

Due to the small farmland sizes and strong seasonal crops in China, large-scale agricultural machinery scheduling is difficult to realize in the rental industry. To solve this problem, a DABAA is proposed in this paper. First, the dynamic coefficient is introduced to balance the time demand of farmers, so the applicability of the model is enhanced in the farming season. Then, the traditional ABC algorithm is modified to obtain the ABC algorithm with mutation, which further improves the global search ability. Additionally, optimal fusion evaluation is performed to combine the ABC with the MMAS to reduce computation time, and the iterative threshold adjustment method improves the accuracy of the optimal solution. Therefore, these improvements enhance the global search capability of the algorithm in the early stage and increase the convergence speed in the later stage. The comparison experiments on the ABC, GA, MMAS and DABAA show that the DABAA is superior to the other algorithms. Our team has been engaged in the agricultural machinery industry for many years and has discovered the realistic requirements of agricultural machinery rental from actual situations. Based on the team's agricultural practical experience, the model in this paper is not much different from the actual situation. Moreover, the research in this paper is based on big data; it is meaningless to experiment with a small range of small data, which does not reflect the advantages of the algorithm. At present, the domestic agricultural machinery environment in China restricts large-scale scheduling experiments, such as the lack of large agricultural machinery rental companies and the differences in agricultural machinery standards in different regions. Carrying out large-scale leasing experiments requires the government to formulate supporting policies and unified standards and the cooperation of agricultural machinery companies and farmers. At present, the research in this paper provides theoretical and model support for future practical applications, and the team is conducting research on the agricultural machinery rental platform. In the future, the team will contact appropriate agricultural machinery companies to jointly develop agricultural machinery rental platforms and negotiate with the government to apply the proposed system of this paper to actual verification. In general, especially in China, the combination of cloud manufacturing and agricultural machinery rental is still immature. There is still much room for improvement in the optimization of agricultural machinery rental in cloud services. Various intelligent algorithms need to be further optimized and improved. Deep learning (DL) and reinforcement learning (RL) algorithms can also be combined with the ABC and other algorithms for application in the scheduling and optimization of agricultural machinery rentals. In addition, in the construction of the evaluation model, cloud service technology should be further combined with agricultural production. Therefore, research on agricultural machinery rentals in cloud manufacturing needs to be further deepened, and agricultural machinery rental service platforms based on cloud services need further research.

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