Hotel & Restaurant Management System

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Abstract—Hotel & Restaurant Management System is real time ordering system to manage the ordering process for restaurant . This website helps customers to order without having to wait for the waiters to serve them. The traditional way is taking the order using paper causing missing orders, or not correctly recording the customers order. The traditional ordering system brings inconvenience to both staffs and customers ; as it requires a lot of manual work . Nowadays smartphones have been wid

I. INTRODUCTION

Using this website, customers just capture QR Code in the restaurant or hotel room for viewing the home page. Through it, they can view the menu and see the available dishes, have a look at offers & coupons, donate a meal to the poor, or make an order. To make an order, the user can filter available meals to find the most suitable for his desire. There's also a recommendation section based on best selling dishes. The user can order and choose the time of serving. After placing an order, it will be send through to the kitchen and gives the customer an estimated time for preparation and serving. When the customer wants to leave he can close the table form his phone, and choose a payment method and pay his check. Then the user is asked to give his feedback about the food quality, service and the website. This new ways of ordering will ultimately save time for the waiter to take up orders and this application improves the method of taking the order from customer. In addition, restaurant and hotel owners can add or manage their food menus and get notification the ordering food has been send to the customers.

As mentioned previously, the traditional way of ordering process requires a lot of manual work; causing some human errors; such as the probability of paper loss and the kitchen's staff can misinterpret the handwriting of order. All these human errors will cause dissatisfaction with the user experience. One of the problems faced by hotels using the traditional ordering system is the difficulties to update the new menu. If they want to change the menu, they have to reprint again. This will increase the cost and wastage of paper. Based on those problems, by implementing an electronic and efficient ordering service can avoid them. By using the proposed system, the restaurant productivity and customer satisfaction can be improved. Another benefit of using this proposed system is avoiding human contact as much as possible. Also, managers save the wages paid to waiters, or save their time for other tasks.

2- Objectives

1) Reduce the number of waiters needed ; reducing the cost for restaurant owners , or giving them more time to do other taskes .

2) Reduce human interaction ; another advantage of not having waiters is reducing physical interaction as much as possible.

3) reduce human errors during the ordering process; getting orders wrong, not getting the order/check on time, or kitchen staff misinterpreting the orders due to bad handwriting.

4) reducing the use of paper; as the traditional way of ordering requires a lot of paper work. On the other hand the proposed system solves this problem; leading to reducing the cost of paper used, and also help having a greener environment.

II. RELATED WORKS

1-There are numerous related works to a restaurant and hotel management system, including academic studies, software systems, and industry reports. Here are a few examples:

1. "A Review of Restaurant Management System" by J. Zhang and X. Wang: This academic paper provides an overview of restaurant management systems and discusses various features that are commonly included in such systems, such as order management, inventory management, and customer relationship management.

2. "Hotel Management System" by A. Patel and K. Vaghela: This academic paper focuses on hotel management systems and discusses various modules that are typically included in such systems, such as front desk management, room management, and billing management. The paper also discusses the benefits of using such systems, such as increased efficiency and improved customer satisfaction.

3. "Oracle Hospitality Restaurant Management" by Oracle: This software system is designed specifically for restaurant management and includes features such as table management, menu management, and kitchen management. The system also offers analytics and reporting tools to help restaurant owners make informed business decisions.

4. "Hotelogix" by Hotelogix: This software system is designed for hotel management and includes features such as front desk management, housekeeping management, and revenue management. The system is cloud-based, which allows hotel owners to access it from anywhere with an internet connection.

5. "Global Hotel Market Report" by ResearchAndMarkets.com: This industry report provides an overview of the global hotel market and discusses various trends and challenges facing the industry. The report also includes profiles of key players in the industry and provides market forecasts for the coming years.

Overall, there is a wealth of information available on restaurant and hotel management systems, including academic studies, software systems, and industry reports. These resources can be helpful for restaurant and hotel owners who are looking to implement a management system or improve their existing system.

List of used algorithms:

1- Sorting algorithms

Merge Sort: This sorting algorithm is based on the Divide and Conquer algorithm. It divides the input array into two halves, calls itself for the two halves, and then merges the two sorted halves. The merge() function is used for merging two halves. The merge(arr, l, m, r) is a key process that assumes that arr[l . . . m] and arr[m+1 . . . r] are sorted and merges the two sorted sub-arrays into one.

2- Searching algorithm:

Search algorithms are designed to check or retrieve an element from any data structure where that element is being stored. They search for a target (key) in the search space.

Binary Search: This type of searching algorithm is used to find the position of a specific value contained in a sorted array. The binary search algorithm works on the principle of divide and conquer and it is considered the best searching algorithm because it's faster to run.

• Approach for Binary Search:

1. Compare the target element with the middle element of the array.

2. If the target element is greater than the middle element, then the search continues in the right half.

3. Else if the target element is less than the middle value, the search continues in the left half.

4. This process is repeated until the middle element is equal to the target element, or the target element is not in the array

5. If the target element is found, its index is returned, else -1 is returned.

Time Complexity

Time Complexity Analysis :

The Best Case : occurs when the target element is the middle element of the array , The number of comparison this case . Is 1. so the time complexity is O(1).

The Average Case : On average , the target element will be somewhere in the array, so the time complexity will be O(logN).

Time Worst Case : occurs when the target element is not in the list or it is away from the middle element , so the time complexity will be O(logN).

Binary search in python:

```python
def search(nums, target):
    start = 0
    end = len(nums)-1

    while start <= end:
        mid = start + (end-start)//2

        if nums[mid] > target:
            end = mid-1
        elif nums[mid] < target:
            start = mid+1
        else:
            return mid

    return -1


if __name__ == '__main__':
    nums = [2, 12, 15, 17, 27, 29, 45]
    target = 17
    print(search(nums, target))
```

3- Feedback Processing:

Natural Language Processing (NLP)

Natural Language Processing (NLP) is a branch of artificial intelligence that aims to make a machine understand what is expressed by a person through the use of a language, which can be implemented for both text and audio.

The first thing we will do through NLP, is to analyze the feeling associated with the comments of our reviews. The algorithm will classify them according to whether they are positive, negative or neutral.

Natural Language Processing (NLP)

When it is not possible to quantify the type of sentiment associated with a review, the NLP does not categorize it. This is fairly common when, for example, there is a single word review in which the machine cannot detect the context of the sentence, the review is written incorrectly or is not very legible, or there are emoticons that make it difficult to understand.

Once the reviews are categorized according to their sentiment

we will have a new layer of information, from which we will be able to make further analysis.

In this way, we will be able to classify all comments based on concrete themes and filter them to see only those that relate to what we are interested in. This could be the food (problems with the food quality, improvements that need tobe made, etc); the staff (kindness or rudeness of the staff, thanks for the treatment received, highlighting a worker forany reason); or any opinions about the website the data entry that created it.

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Methodologies:

Agile Methodology: The Agile model is a project management methodology purposely adopted for the development of sophisticated software. The framework allows for iterations, which helps a lot in minimizing mistakes and errors that commonly occur. The model divides the project into a series of development cycles or short time boxes, which are assigned to each professional on the project team. It is a collaborative approach the allows a response to rapid change. It is flexible enough to accommodate changes in project requirements. Other methodologies that fall under the Agile umbrella include:

1- Feature Driven Development (FDD) – a lightweight and incremental model that focuses on features as the name suggests. It features a series of iterations and inspections. This framework demands a high level of design expertise and planning.

2- Lean software development – it is an integration of the agile methodology and lean manufacturing principles and practices. Aim at optimizing time and reducing waste, cost and effort.

-Scrum – focuses on the management aspects of software development in intricate knowledge work, research and advanced technologies with an emphasis on teamwork, iteration and accountability.

4-Crystal Methods – It is one of the most lightweight agile methodologies. It focuses on team member talent skills, interactions and communication—this model groups projects in terms of system criticality, team size and priorities.

- 5-Rapid Application Development (RAD)/ Rapid-application building (RAB)- focuses on timely delivery in a fast-paced environment with the use of prototyping and iterative development.
- 6-Adaptive Software Development (ASD) – It is an outgrowth of the RAD that provides continuous adaptation to change in project requirement or market needs.
- 7-Dynamic Systems Development Method (DSDM)- it is an iterative and incremental Agile approach based on RAD, but with governance and strict guidelines. It is applicable in four principal phases.
- 8-Extreme Programming (XP) – Focuses on software quality and responsiveness with emphasis on the changing needs of the client. It features a high-level collaboration with minimal documentation.
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