

# Recommendation System for Food Items in Restaurants



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## ABSTRACT

Whenever we want to go out for a meal or snack, there is always the question where and what to eat? Currently there are numerous food related websites which assist us with information like menus, photos, reviews, probable prices, and often provide delivery services. But, there is no such web service that eliminates the burden of searching through extensive menus to give instant, appropriate combinations of food items to suit the user's taste. We have developed an app that provides such combos from pre-existing food items in restaurants and eateries.

**Keywords**— food combinations, association rule mining, apriori algorithm.

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## I. INTRODUCTION

In this fast moving world, there is a crunch for time. We struggle and strive to save every ounce of time that we can save, spare or spend on better things. Due to great extent of use of social media and technology, it is essential to use the latest day to day social trends to reach out to the masses to make your voice heard. Food is and always will be the centre of attraction of social gatherings and hangouts. In restaurants, cafes or the beloved local eateries at the side of the road, food is what brings us together in almost every aspect of life. Applications and websites on the web offer and put forth trends and tales of the bustling food life that goes around the city by having blogs, advertisements, infomercials and digitally available menu cards of each and every eatery in town. They aim to assist the users to find new places to try and experience the plethora of restaurants in your vicinity. The problem with this setup of online platforms for providing a better dining experience is that it solves the problem of “where to eat” but fails to some extent to help the users to decide “what to eat”. In accordance with that we have come up with this idea to provide the users with a completely new dining experience by solving the aforementioned question, “what to eat”. It so happens that we walk into our favourite restaurant and repeatedly order the same food that we like, eat and go. Even though there is nothing wrong with that, it diminishes the fact that there could possibly be numerous items on that very same menu that also taste good but haven't been tried due to

lack of enthusiasm, interest, time or just lack of knowledge of their existence. We are proposing a system that gives appropriate food item combinations from pre-existing menus. Considering the never-ending food items available and the number of restaurants, it is difficult to fathom the enormity of this project. However, by taking in common the common food items that cater to all restaurants, it is possible to reduce the problem to some extent. With that comes the continuously evolving Apriori algorithm that enables us to find associations rules and frequent item sets, which in this case would be the combination of food items that the users will try. We all have our basic instincts as to how certain combinations of food items taste the best. For example: the traditional three course meal consists of a starter/entrée/appetizer, a main course and a dessert. But, rely on others to suggest what is good among these categories. A system that includes all these suggestions from the regular customers from certain restaurants, along with inputs from the owners and chefs, would give rise to a robust computerized system that recommends the users to have a good dining experience without having to give much thought and time to decide what to eat. Also, the Apriori algorithm would assist in finding frequent itemsets that users try on a daily basis.

There are numerous reasons for the onset of this idea.

1. When users go to a restaurant or want to order online, there lies a big confusion as to what to order.
2. Suggestions of food item combinations in a particular eatery are restricted to word-of-mouth and reviews may not always be available for each and every place.
3. There is a typical stereotype; go to same places and order the same food as we know it is good. This has held back users from trying new things, which may also be good but haven't tried it due to lack of experimentation or knowledge.
4. Reviews given by most applications and websites rely on user trust and content filtering, which is an additional overhead for such platforms.

## II. RELATED WORK

Currently, there are systems in place that give access to detailed information, available digitally over the web. Also, finding new places to dine in has become easy because of the same and any person (resident or foreigner) can explore the locality in a few clicks.

The most noteworthy contribution to this scenario is the [www.zomato.com](http://www.zomato.com) website, commonly referred to as 'Zomato'. It paints a very accurate picture of how any restaurant looks like. After their preliminary survey of a newly opened place, they upload restaurant information on their site (and app). This multimedia information gives restaurant name, address, restaurant open hours, primary cuisine served, type of eatery (café, bar, club, rooftop restaurant, etc), availability of air conditioning, average cost for 2 people, etc. Needless to say that it is very detailed in that matter. Furthermore, there are snapshots of Menu cards that enable the user to know the preparations therein, before the person actually visits the place. To strengthen this restaurant provided information is the support from end users who upload photos and write reviews and dining experiences they have had with the concerned place. These reviews are sent directly to the restaurant owners and also made public so that others can benefit from the same. This feedback enables the restaurant owners to make necessary changes to serve the customer better. Zomato bears the overhead of content management and filtering the reviews to authenticate the legitimate ones.

In order to get food, it has to be ordered. With this gist in mind came a few websites that helped the home-sitting user to order food from any restaurant that offers delivery in the locality. Keeping the digital menus' concept firm, the user can add food items to the digital cart (resembling a shopping cart in a supermarket) and order the food after payment.

One of the first sites to introduce this facility was [www.foodpanda.com](http://www.foodpanda.com). It brought together a chain of disconnected restaurants to become a single platform wherein the user could choose (for example) their favourite Pizza from all pizza chains without having to use different apps or sites for each individual Pizzeria. The former competitor [www.tastykhana.com](http://www.tastykhana.com) merged into the currently active foodpanda website. Zomato, too, started the online ordering system later in 2015 as a competition to the others. It bore an advantage over the others as it undertook a larger range of restaurants to order from.

Another step forward into this idea resulted in the emergence of [www.tinyowl.com](http://www.tinyowl.com). A website that reduced the user's work by providing a few pre-defined combination of food items that are either famous, most sold or specialities of the place. A very attractive site with equally attractive HD resolution photos of the combos that are displayed. The limitation of the website is that, one cannot order anything apart from the pre-defined combos and in a way, forces the user to order the entire combo, even though all of its items may not be appealing to the user.

All these food ordering platforms receive a portion of sales of the food ordered and the profit margin for each site is fixed, which some restaurants cannot afford. This is a reason why some of these places are only on either of the platforms.

However, the advantages of the above mentioned sites is that it brings the food community and people together, all under one roof. Each of them have their own perks and disadvantages but they aim to fulfil the food cravings of the user.

## III. ANDROID

Android is a Linux-based operating system which is primarily designed for handheld mobile devices. Most embedded applications are for ARM based devices.

Android was founded by Andy Rubin, Rich Miner (co-founder of Wildfire Communications, Inc.), [20] Nick Sears [21] and Chris White (headed design and interface development at WebTV) [9] to develop, smarter mobile devices which are aware of its owners location and preferences.

The android versions are named after famous sweets like Astro, Bender, Cupcake, Donut, Éclair, Froyo, Gingerbread, Honeycomb, Ice Cream Sandwich, Jelly Bean, KitKat and Marshmallow.

### Features:

- **Storage**

SQLite, a lightweight relational database, is used for data storage purposes.

- **Messaging**

Android Cloud to Device Messaging (C2DM) and now improved version of C2DM, Google Cloud Messaging (GCM), and Android is also a part of Android Push Messaging service.

- **Connectivity**

Android supports connectivity technologies such as GSM/EDGE, IDEN, CDMA, EV-DO, UMTS, Bluetooth, Wi-Fi, NFC, LTE and WiMAX.

- **Java support**

Most of the Android applications are written in Java but there is no Java Virtual Machine in the platform and Java byte code is not executed. Java classes are compiled into Dalvik executables and run on Dalvik. It is a specialized virtual machine

designed specifically for Android. It has been optimized for battery-powered mobile devices with limited memory and CPU.

#### IV. PROPOSED SYSTEM

To overcome the limitations of the aforementioned websites and provide a newer dining experience we propose a dynamic, computerized system that would not only provide restaurants' information but also generate food item combos from the ones in the vicinity of the user (location entered by the user), depending on the number of people and an optional amount constraint. This facilitates the user to get an output that lies in the budget. The number of people constraint decides the multiplicity of the food items to satisfy the hunger of all the users.

Firstly, the menus from all eateries will be fed to the database, wherein, restaurant information would be stored in detail. This is necessary give an overview of the place and to co-ordinate the timings in which the restaurant is open with the output of the system because a combo cannot be displayed if the restaurant is closed at that that time.

The user then inputs the location, number of people and an optional amount (user may not be on a budget). Based on the general ordering trends in the daily world like;

1. Starter/breads , main, dessert (lunch and dinner)
2. Main and dessert
3. Starter and main
4. Just main
5. Breakfast
6. Snacks
7. Tea and coffee, etc.

The system will generate some combinations of items in these categories. For example: for starter, main and dessert section, the system would likely suggest a garlic bread, a sizzler and chocolate brownie with ice cream or a chicken satay, a burnt garlic rice with vegetables in black bean sauce and a litchi ice cream. Many combinations such as the above would be generated at random.

The randomly generated combinations would be endless and sometimes, illogical. Like a pizza suggested with coleslaw salad. To overcome is this disadvantage, the system administrator has the option to manually enter the any combinations that are known to all of us and then base our new combinations around these. The user has the power to reject the non-appealing combos in a click and also to rate them as per their will. The combos with the highest ratings will be separately stored in a knowledge database for faster retrieval by the system. If no relatable data is found in the knowledge database, then new combos are generated.

Since users are rating the food item combo and its individual items separately, it is very valuable as it denotes the value of the food item and not just the restaurant. This ensures that the best food is rated up and the bad, rated down, no matter what the restaurant ambience is. Also, if one wishes to know about the ambience and other information, that person would get the same by just clicking on the combo. A pop up type window would display it.

After having tried the food, the user is expected to rate the same on the next login into the app. This is helpful for personalized suggestions. In addition to that, association rule mining would be done on the user history and transactions to find out frequent itemsets that user has tried. This would help uncover food combos that are previously

unknown to other users and to the system and additions can be made to the knowledge database. This association rule mining would be done with a modified version of the Apriori algorithm. With this aspect of data mining, it is possible to have a robust system to give intriguing outputs.

#### V. CONCLUSION

Using association rule mining, user interaction and previous knowledge obtained from professionals, it is possible to create this recommendation system. The combinations generated can possibly be endless and may give ineffective output at the beginning. These techniques can be scaled up to bigger restaurant databases to provide food combos all across the world.

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