

USING ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING TO CREATE A TRAVEL PLANNING SYSTEM BASED ON USERS' PREFERENCES AND BEHAVIOURS

by

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BBA, Laurea University of Applied Sciences, 2013

A major research project presented to Ryerson University in partial fulfillment of the requirements for the degree of Master of Digital Media in the program of Digital Media

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ABSTRACT

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Master of Digital Media

Digital Media

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Travel and tourism have become a worldwide trend, and the market for this industry continues to grow extensively. Although most people enjoy traveling, planning trips can take hours, weeks or even months to ensure the best place, the best itinerary, and the best price is found. With Artificial Intelligence (AI) and Machine Learning (ML), large datasets can be analyzed and an AIinfused travel system can be utilized to generate highly personalized suggestions.

The main purpose of the project is to create a travel planning application to provide an efficient and highly personalized experience for users. The app will help users plan their trips, choose activities, restaurants, mode of transportation and destinations that fit their preferences, budgets, and schedules in minutes without having to spend hours researching on the Internet or downloading multiple travel apps.

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I. INTRODUCTION

1. Background of the study

These days, lots of travel apps are available to help travellers plan and navigate their trips. Digital travel sales are forecast to reach eight hundred billion USD by 2020, according to Statista ("Digital travel sales worldwide from 2014 to 2020 (in billion U.S. dollars)," 2016). As of March 2017, with a 3.93 percent share of all active applications, travel applications are continuously listed among the most popular categories in the Apple App Store, and in 2016, travel and local applications have reached 95.88 percent of Android users in the United States("Digital travel sales worldwide from 2014 to 2020 (in billion U.S. dollars)," 2016). Travel and tourism have become a worldwide trend, and the market for this industry continues to grow extensively.

Although most people enjoy traveling, planning those trips can take hours, weeks or even months to ensure the best place, the best itinerary, and the best price is found. A recent study by Google stated that Canadians spent an average of 30 days planning their trips, with six of them devoted to booking ("Travel booking trends revealed in let's-book-it moments," 2016). With Machine Learning (ML) and Artificial Intelligence (AI), large datasets can be analyzed and an Alinfused travel system can be utilized to generate highly personalized suggestions.

This research aims to understand users' needs by means of an AI-powered online application and utilize it to personalize and make the planning process more efficient. This application can perform tasks of a travel agent with data gathered from third parties such as travel services providers or review platforms. The system will use AI and ML algorithms to reduce time and expenses when planning a trip based on users' preferences and behaviors.

2. Objective and approach of the study

The main purpose of the project is to create a travel planning application to provide an efficient and personalized experience for users. The app will help users plan their trips, choose activities, restaurants, mode of transportation and destinations that fit their preferences, budgets, and schedules in minutes without having to spend hours researching on the Internet or downloading multiple travel apps.

After planning their first trip, users will be able to rate or write reviews about their experiences with vendors recommended by the system, so that the AI-powered system can learn, analyze user sentiments to improve and recommend more suitable options in the future. Eventually, the system can plan personalized trips entirely for users, and users will only need to review, make any required revisions and book their trips within the platform.

3. Limitations of the study

Al and ML are still a relatively new concept for mass consumers, so it was a challenge to gather consumers feedback. The hypothesis and problem statement of this project were built entirely based on previous research studies and survey results conducted by third parties. Due to the rapid development of technology, the research results may be outdated shortly.

4. Structure of the study

This project is divided into three different sections: theoretical background, potential solution, and conclusion. The theory section includes two parts. The first part explores the current state of the travel industry in the 4.0 era with opportunities, challenges, and lastly,

emerging trends. The second part gives a holistic view of how AI and ML are being utilized in the travel industry to plan personalized trips and accommodate varying user needs.

The potential solution section discusses the concept of the AI-driven application, how its features are most relevant to the problem at hand, and finally, a potential recommendation to implement the solution.

Ultimately, conclusion and future directions present broad recommendations and strategies that could have an impact on the entire field.

II. THEORETICAL BACKGROUND

1. State of the travel industry worldwide

1.1. The travel industry at a glance

The worldwide travel and tourism sector is still going strong, outpacing the growth of global GDP in 2018 for the eighth year in a row, according to new research from the World Travel and Tourism Council (WTTC). Travel and tourism rose by 3.9 percent in 2018, above 3.2 percent global GDP growth and adding a record \$8.8 trillion and 319 million new jobs to the world economy, according to the WTTC ("Travel & Tourism continues strong growth above global GDP," 2019).

The report also found that in 2018, 10.4 percent of all global economic activity was generated by the travel and tourism industry. It has been accountable for one out of five of all new jobs created globally over the past five years. It is also the world's second-fastest growing industry, ahead of healthcare (up by 3.1 percent), IT (up by 1.7 percent) and financial services (up by 1.7 percent), and behind only manufacturing, which was up by 4 percent ("Travel & Tourism continues strong growth above global GDP," 2019).

In a recent statement, WTTC President and CEO Gloria Guevara noted that the travel and tourism industry is expected to add over 100 million new jobs worldwide in the next 10 years, representing 421 million employment by 2029. ("Travel & Tourism continues strong growth above global GDP," 2019).

According to ADI (Adobe Digital Insights) market research in the travel sector— 41 percent of the company and 60 percent of leisure travel agreements are now being made online (Abramovich, n.d). The need to satisfy the requirements of customers in person as well as on the

internet remaining in line with the changes in travel and tourism technology as well as new trends in customer experience. Travel companies will need to adjust approaches, stay in line with travel tech trends and provide clients with a perfect and unique traveling experience in order to gain an edge over competitors.

1.2. Trends in the travel industry

a. Planning and booking trips

A survey by AARP in 2018 states that travel planning is taking place earlier as compared to years past (Gelfeld, 2018). An 88 percent of Baby Boomers planning domestic travel in 2019 have already selected their destination, which is an increase from 72 percent of 2018 domestic travellers (Gelfeld, 2018). For Baby Boomers traveling abroad, 31 percent have booked their 2019 trips by September 2018, increased from 17 percent in 2017 and 23 percent by September of the previous year (Gelfeld, 2018).

When it comes to booking trips, HuffPost reports that over 95 percent of leisure travellers read at least seven reviews before booking their holidays ("Digital Trends That Are Transforming the Travel Industry in 2017", 2017). A research by Nielsen also found that travellers spent an average of 53 days visiting 28 different websites over a period of 76 online sessions, with more than 50 percent of travellers seeking travel advice on social media ("7 Travel Marketing Trends Worth Exploring in 2017," 2017).

Most travellers book one to three months in advance, according to Expedia Viewfinder. When broken down by gender, men were more likely to book two to four weeks out than women, while women were more likely to play it safer, booking three to six months ahead. Of all the

travelers interviewed, 11 percent preferred booking their trips six months or more beforehand (Mulliner, 2017).

These statistics show the majority of travellers plan months ahead, spend a significant amount of time to secure the best deals and rely heavily on social media for recommendations.

b. Mobile Application

The other prevalent trend observed within the travel industry is the reliance on mobile application. Recent years' overview of the travel and tourism industry has shown that half of the internet reservation activities are on mobile. Mobile apps can not only enable booking processes, but also allow guests to gain control over room appliances when coupled with IoT — Internet of Things ("Top 10 Travel Industry Trends in 2019," 2018).

According to Criteo, approximately one-third of all travel bookings are now made on mobile devices ("7 Key Trends for the Travel Industry in 2018," 2018), while Travelport Digital found that 80 percent of travellers use a smartphone app to research a trip in 2018 ("Mobile Travel Trends 2018," 2018).

As of March 2017, with a 3.93 percent share of all active applications, travel apps were continuously listed among the most common categories in the Apple App Store. Travel and local applications also reached 95.88 percent of U.S. Android users as of December 2016 ("Digital travel sales worldwide from 2014 to 2020 (in billion U.S. dollars)," 2016).

On the other hand, promotional messages can be used as a part of the travel marketing strategy. Combined with beacon technology, mobile apps are able to make choices relevant to their individual's preferences. With this in mind, the mobile-first approach should be taken into consideration for a perfect app design.

c. Artificial Intelligence and Chatbots

Another growing trend in the travel and tourism industry is Artificial Intelligence and Chatbots. AI has become more popular in the travel industry in recent years. The application for travel would have built in customer support, which is realized via chatbots. It is estimated that 40 percent of large business brands will adopt the technology by 2020 which encompass travel industry businesses as well ("80% of businesses want chatbots by 2020," 2016).

Chatbots demonstrate topnotch ability to accurately and continuously sort through data and to deliver rapid responses to the problems or queries. An AI-driven chatbot is able to draw conclusions based on customer feedback and learn from interactions to make more precise predictions.

d. Personalization

Increased personalization is a growing demand among travellers. Nearly 90 percent of travellers around the world acknowledge that the present process of traveling needs to be further personalized. More than something exceptional, a personalized travel experience is now regarded as an expectation. Whether it is a holiday or a business trip, people value the unique experience they can get while on the go. In fact, in the modern travel and tourism industry, personalization has become the first priority ("Top 10 Travel Industry Trends in 2019," 2018).

Today's travellers expect a seamless journey throughout their trip. In many cases, it comes down to communication. Personalization is not just experienced the moment the traveller books the trip. It occurs throughout the journey: the inspiration phase through the stressful trek through the airport, the actual plane ride, and everything that happens after the plane lands and the traveller arrives at their destination.

To compete within the modern travel industry, travel companies must personalize their approach with customers to add inherent value. When marketing to customers, travel agents must get the right offers to the right clients based on loyalty. According to a survey by Mindtree, 88 percent of participants reported being more loyal to a brand that offers relevant deals. Of which, 47 percent of respondents said that they are willing to pay a premium fee for more personalized and pertinent offers ("Expectations vs. Reality: How to Better Serve the Connected Traveler," 2018).

1.3. The importance of understanding consumer behavior and personalization in the

travel industry

Today, building more relevant and personalized customer experiences is critical to differentiate a brand in an increasingly competitive market.

In a survey published at Adobe's North American 2018 Summit, consumers were asked to rate various digital experiences based on what they expect versus what they get. The survey confirmed that younger travellers view personalized experiences as an expectation when choosing among their favorite travel brands ("Understanding Travel's Personalization Revolution," 2018).

"Millennials in the 25 to 34-year-old demographic are less likely to be impressed versus having an expectation around travel experiences," said Julie Hoffmann, Adobe's head of industry strategy for travel. "These global travellers are setting the bar as they move into the primary travel demographic over the next 10 years." ("Understanding Travel's Personalization Revolution," 2018).

In order to efficiently market to consumers, travel brands must get smarter about how they gather and use customer data, using that knowledge to deliver customized, real-time marketing at scale. Companies must strive to provide more personalized paths for travellers. By deeper understanding of the various consumers, companies can realize smarter allocation of media dollars and marketing budgets, unlock more precise campaign targeting, retargeting, and optimization, and ensure better overall performance on campaigns.

Personalization is considered one of the biggest trends when it comes to travel customer experience ("Millennials love travel. How travel brands can love them back," 2017). With a growing volume of data collected from every customer touch point and increasingly advanced analytics, today's travel companies have all the information and tools needed to make offerings and communications more meaningful than ever before.

1.4. Challenges and opportunities

Although personalization is now demanded by travellers, there are some challenges that need to be overcome to deliver this efficiently.

a. Data collection and privacy

Good personalization starts with good data. A strong personalization strategy should rely on a mix of first-party data (the information a company can gather from its own websites, social media activity, and mobile apps) and third-party data from outside sources such as Facebook news feeds and search behavior. Companies must also have an effective privacy policy in place so that they will not violate the principles of personal privacy, but they will still be able to capture the necessary data.

b. Use technology to deliver personalized experiences

Once travel companies gather the right data, the next step is to select and use the right technology tools to implement personalized experiences throughout the customer journey. Personalization requires sophistication and technological solutions as part of the service provided. In order to make optimal use of the data collected, companies must determine how and when to disseminate more personalized interactions throughout the customer journey. Mobile app experience analytics is one technology solution that will become critical for travel companies to personalize the in-trip experience for travellers.

It is clear that today's travellers increasingly expect and demand personalized experiences. This presents a great opportunity to use customer data to automate trip planning and provide an unbiased view on many destinations and travel services. Personalization can also help brands stand out and improve audience engagement to utilize the data they collect and better tailor their messaging and services.

2. Al and ML in the travel industry

According to Schafer (Schafer, 2001), recommender systems are frequently described as applications used by e-commerce sites to suggest products or services using data gathered from consumers to facilitate their decision-making processes. Many businesses in the travel and tourism industry use recommender systems that try to mimic the interactivity happened in traditional travel agent counselling sessions, when customers seek advice on a possible holiday destination. Technically, they primarily use a content-based approach in which the user uses the

provided attributes to express needs or requirements. Then, the system matches the user preferences with products in a catalog of destinations.

Today, with the rapid development of AI and ML, this process can be automated, and much bigger datasets can be processed in much less time to give the most relevant recommendations to users.

2.1. How companies are helping travellers plan and book their trips

The travel industry continues its rapid technological development, which shapes the experiences of each global traveler. Many companies have taken advantage of current technologies to help travellers plan and book their trips more efficiently.

There are five main steps in trip organization: choose a destination, search and book flights, book accommodations, take care of local transportation, and, last but not least, plan things to see and to do. A majority of global travellers now prefer planning everything online. And a big range of trip-planning platforms has emerged to serve the niche. Most of them will target specific steps, like finding accommodations or tickets with the lowest fares. But recently, more advanced planning services have been introduced to the market which revolve around setting the whole trip arrangement beforehand to save time and money. Below, some planning services such as these will be explored.

a. TripHobo

TripHobo is a free trip planning automation tool that enables users to plan journeys that meet their budgets. A user defines a trip budget and destination. The system is semi-automatic which plans everything that includes flights, accommodations, activities, and even restaurants to

visit in line with the set budget. Also, a traveller can customize the plan by including or removing hotels, attractions, and events.

Another useful feature of TripHobo is that users can save and share trip route on social media with friends. Currently, the service covers over 14,000 cities across the world.

b. TripIt

TripIt is a travel app that organizes all user's travel plans into an itinerary and puts all trip details in one place. The app can scan all travel confirmation emails (e.g. flights, hotels, etc.) and add them automatically to the user's account. This app will transform users' upcoming travels into a master itinerary.

TripIt Pro, which costs \$49 a year allows users to receive reminders of when to leave, flight status, security wait times, connecting flights, and terminal and gate information.

c. Travefy

Travefy is an itinerary management and communication software for travel professionals, including travel agents and tour operators. Travefy also provides online and mobile group travel planning apps that allow users to organize group travel, create itineraries, track and split expenses.

With Travefy Pro (\$39/ year), travel agents and tour operators can easily and quickly build, customize and share itineraries with their clients via email or direct messaging.

d. Welcome

Welcome is a new app that was launched in June 2019. Instead of asking travellers to create their own itineraries by browsing through a list of recommendations and reviews, Welcome builds the itinerary for them (Ha, 2019).

Welcome focuses on suggestions in real time and utilizes AI to generate customized itineraries for users. Users can, for instance, open Welcome and browse through a list of potential places and events stating which ones they are interested in. Welcome then enables a schedule to be created based on the user's answers, composed of both locations the user wished to visit and activities that would interest them. The itineraries adjust in real time — if the user is not interested in one of the items on the list, the user can swipe to skip it, and Welcome will automatically fill the gap with new activities (Ha, 2019).

2.2. The ethics of collecting users' data and using AI and Machine Learning to

build a trip planning system

According to a study by American Express, 83 percent of Millennials said they would allow their digital patterns to be tracked by travel brands if this would give them a more personalized experience. Furthermore, 85 percent of participants of all ages believed that customized itineraries were much more desirable than general, mass-market offerings (Abramovich, n.d).

Booking.com also mentioned in its survey that nearly a third (29 percent) of global travellers say they are comfortable letting a computer plan an upcoming trip based on data from their previous travel history, and half (50 percent) do not mind if they deal with a real person or computer, so long as any questions are answered ("Eight Travel Predictions for 2018, as revealed by Booking.com," 2017)

These statistics proved that travellers are open to having their data collected by travel companies to acquire more relevant and personalized recommendations. And therefore, it is

acceptable by mass consumers to build a travel planning system using AI and ML, as long as customer data is secure and protected.

2.3. How AI and Machine Learning can disrupt the travel industry

Below, some of the realized implications of AI and ML in the travel industry can be applied to build an optimal travel planning system.

a. Recommendation engines

Recommendations are often provided by matching the customer's wishes and needs with available offers. Each customer's digital footprints on the travel platform enable the system to recognize each customer's requirements, budget and preferences to be able to suggest relevant deals. Delivering the right recommendations at the right time will help reinforce customers' loyalty, keeping them coming back again and again.

b. Route optimization

Route optimization plays a major role in the travel industry. Trip planning can be quite difficult, taking into consideration various locations, schedules, working hours and distances. Using AI and ML, route optimization can minimize travel expenses and distance, save time, and enhance overall customer satisfaction.

c. Chatbots

Customer care is very important in the travel industry, and chatbots enable full 24/7 customer assistance to be provided, decreasing the load on personnel. Chatbots allow Instant responses at any moment of day or night, offering extensive assistance and handling human interactions in a friendly and efficient way. With the proper pre-programming, chatbots can

empower the entire travel experience, beginning with automated reminders prior to arrival to suggest nearby entertainment spots and transport services at destination.

3. Summary of the theoretical background

The travel industry is one of the world's largest industries and it has experienced consistent growth every year. On the other hand, AI has been talked about as the next big thing to completely change the way we live in the next few years. When applied in the travel industry, AI is a powerful tool to facilitate customer-travel provider relationships, instantly enriching the experience and providing a frictionless experience.

This project aims to change how people plan their trips and travel entirely by providing an exceptional and personalized user experience. With a vision around partnering with major travel companies such as airline companies, Airbnb, Expedia, and smaller businesses such as local museums, bars, restaurants, users can use the app to find everything they need within one platform to save time and money when planning for their trips.

With the purpose of making the process of planning a trip a fun and seamless experience, the User Interface of the app will be designed in a way that everyone, from an elderly to a busy businessman, can easily use. It will also be a source of travel information for travellers, discounts on services, and a community of travel enthusiasts to connect and potentially travel with one other, all in one platform.

III. POTENTIAL SOLUTION

1. Product strategy and development

The AI-powered travel planning system is named Love Travel. Love Travel will consist of basic features and premium features.

1.1. Basic features

a. Personalized trip itineraries and recommendations

After downloading the app and signing up, users will need to answer a short quiz to help the system learn about their travel habits and preferences. Then, users can input a desired travel destination, length of trip, budget, and food preferences. Using AI and ML algorithms, the app will create a day-to-day itinerary with recommended attractions, activities and restaurants. Users can review and adjust the itinerary as much as they want.

b. Route optimization

By integrating with Google Maps, the app will be able to choose the most effective mode of transportation, calculating how long it will take to get from one place to another in the itinerary and how much it will cost. Users will feel more confident about navigating a new place, especially if the local language is not the user's mother tongue.

c. Book and reserve online

User will also have options to book flights, hotel rooms, restaurants and tours via the app. The app will integrate with travel partners via APIs so that users can book and pay online within the app without having to check prices and book from multiple websites. By using the app to book online, users can also track and manage their travel budget entirely within the app.

d. Review and rating

Users are encouraged to rate and write reviews about their experiences with vendors recommended by the app, and based on that information, the system can learn more about users' preferences and suggest more suitable and personalized options in the future. The more feedback a user leaves, the better the system will become.

e. Offline access

It is very important to have access to trip itineraries and maps when traveling to a new city or country. A lot of tourists do not have access to the internet in a foreign country, and therefore, being able to access the itineraries without the internet is a must. With the app, users can open their saved itineraries offline and can still use the maps and route suggestions via GPS.

f. Chatbot for real-time recommendations

As mentioned above, chatbot is a significant application of AI in the travel industry. The main purpose of the app is to help users plan their trips in advance, but the app will also have an AI-powered "assistant" to help users with real-time suggestions. For example, if a user does feel unwell and is unable to follow the initial plan, the chatbot will improvise, and suggest other options that better fit user's needs in light of any changes or developments. The chatbot will also send notifications of any local events taking place nearby, such that the user can participate in any seasonal and local special events.

1.2. Premium features for Group travellers

With this premium plan, multiple users can use the app to plan a trip together. They will need to fill out a short questionnaire about their trip, then the system will compile all the answers

to generate an itinerary and recommendations that can accommodate all users' needs and requirements. Users will have access to the shared itinerary, discuss the plan in the app's secure messenger, and make any changes as needed.

The Group planner feature can also help users manage budget for groups of travellers. Within this app, users can easily track expenses, manage budget, divide the costs. This feature will be very helpful, especially for families or groups of friends who usually have different requirements.



2. Data ecology

Illustration 1. Data Ecology

The chart above illustrates how all the data sources are used in the platform. There are 3 main categories, which are User profile, Personalized recommendations, and Chatbot.

2.1. User profile

Data will be collected directly from users. Users will need to fill out a questionnaire after signing up for the app in order to get personalized trip recommendations.

The data will be classified and labeled under 5 sections:

a. Demographic

Demographic information about the user (name, age, location, gender, phone number, etc.) will be collected so that the app can provide users with a more personalized and customized user experience.

b. Travel preferences

Based on user's answers from the survey, a travel profile will be created to determine what travel style and what type of activities that user prefers.

c. Food preferences

The app will take into consideration users' food preferences and dietary restrictions to be able to suggest the most suitable restaurants.

d. Reviews and ratings

After each trip, users will be asked to review and rate all the places suggested by the app.

A Natural Language Processing tool will be used to analyze users' sentiments to better understand users' experiences so it can learn and improve its recommendations in future trips.

e. Trip information

In order for the app to suggest an itinerary, user will have to input some information about their upcoming trip, such as, destination, date of the trip, length of stay, budget, etc. Then, the algorithm will use collected data to generate a personalized itinerary based on the user profile.

2.2. Personalized recommendations

a. Flight recommendations

The app will be integrated with Skyscanner Flight via API. Skyscanner suggests its API users enroll in an affiliate program and get access to a free set of APIs. Once an API user reach a certain revenue threshold, the service allows the user to negotiate a commission based on traffic and market proportion. While Skyscanner also provides car rental and hotel APIs, its strong point is its flight fare search. It comes in two main versions: Browse Flight Prices and Live Flight Prices (Skyscanner.net, n.d).

Live Flight Prices will be a better option for this AI-powered app because the live pricing API will return exact fares for any given moment. This feature is also great when users want to compare prices for specific dates and routes.

b. Hotel recommendations

By becoming an affiliate partner of some big Online Travel Agency (OTA), Love Travel will be able to use their inventory. There are two main players dictating the rules of the OTAs market: Booking Holdings (Booking.com, Kayak, Momondo, etc.) and Expedia (Expedia.com, Hotels.com, Trivago, etc.). Since Expedia Partner Solutions is aimed at online travel agencies and other travel

software providers, while Booking.com supports APIs for smaller travel agencies and channel managers, it will make more sense for Love Travel to partner with Expedia Partner Solutions.

Expedia Partner Solutions API or EPS (former Affiliate Network or EAN) provides access for online travel agencies and travel service providers that want to incorporate hotel booking support into their products. The API will allow for: Receiving hotel lists, booking, retrieving itineraries, canceling reservations, receiving room images and hotel info and defining payment types ("Travel and Booking APIs for Online Travel and Tourism Service Providers," 2019).

c. Reviews and ratings

TripAdvisor is a trusted source containing over 730 million reviews ("TripAdvisor for Business: The Complete Guide," n.d), and being able to take advantage of its massive database of reviews and ratings will tremendously help the trip planning system to curate the most personalized activities and restaurant choices for users.

TripAdvisor Content API allows businesses to incorporate the main content types from its users and update them in real time. TripAdvisor works with accommodations, restaurants, and attractions providing the following types of content through their API: Location ID, name and address, latitude and longitude, reading and creating reviews, ratings and awards, categories and subcategories (price level, accommodation category, attraction type, restaurants, and cuisine) ("API Description," 2019).

d. Activity recommendations

There are two main sources for finding attractions and things to do for users. These are local services and larger vendors that aggregate and share data combined with ticket purchasing support. Some potential partners to be considered include:

Viator APIs: Viator is a tours and activities (T&A) agency acquired by TripAdvisor in 2014. The OTA accesses about 60 thousand activities and tours around the world. The APIs are delivered in two versions: merchant solutions that enable direct sales of tours and an affiliate program where the end merchant is Viator ("Travel and Booking APIs for Online Travel and Tourism Service Providers," 2019).

Getyourguide: This is another T&A OTA that accesses about 32 thousand activities in more than 7 thousand destinations. Getyourguide's power side links specific attractions and activities with locally related ones. ("Travel and Booking APIs for Online Travel and Tourism Service Providers," 2019)

Klook: Klook is a T&A provider that mainly focuses on Asian tours. The company suggests OTAs enroll in an affiliate program and get access to the T&A database via either a graphical interface or an API ("Travel and Booking APIs for Online Travel and Tourism Service Providers, "2019).

Musement Transactional API: Musement is a wide-range T&A platform combining attractions, tours, nightlife, local food and wine venues, sports, and music events. The API service offers access to over 5 thousand deals in 300 towns across 60 nations worldwide ("Travel and Booking APIs for Online Travel and Tourism Service Providers," 2019).

- Tiqets API: Tiqets is an agency that focuses on digital distribution of museum and attraction tickets. The API allows for retrieving tickets in specified locations and searching for the nearest tickets ("Travel and Booking APIs for Online Travel and Tourism Service Providers," 2019).

By integrating with these APIs, the travel planning system will have access to a massive database of travel activities across the world, and when matched with a user travel profile, the

most personalized activities will be generated for that user. Users will also have options to book tickets directly within the app.

e. Restaurant recommendations

The two biggest players in the market are Yelp and Zomato, and each of them has its own strengths.

According to Altexsoft, Yelp boasts \$173 million active users on a monthly basis ("Online Restaurant Reservation Landscape: Location Discovery, Table Booking, Delivery and Reviews," 2019). Yelp's users depend highly on its ratings, reviews and accurate data to make informed decisions. Many businesses are keen to be listed on Yelp as it integrates its comprehensive database of reviews into their products.

Integrating with Yelp will grant access to their database of restaurant reviews and ratings, and will help Love Travel to pick personalized restaurants that best align with users' preferences and budgets.

Users can also make reservations within the app. Yelp's Table Management App is interconnected with its online booking platform to seamlessly manage reservations from there. Yelp's API offerings include: Yelp Fusion API, GraphQL API, and Yelp platform with Data Ingestion and Checkout APIs ("Online Restaurant Reservation Landscape: Location Discovery, Table Booking, Delivery and Reviews," 2019).

Zomato currently operates in 10 thousand cities globally. Zomato APIs can: Search for a restaurant by name, location, cuisine type; provide information on restaurant coordinates, reviews, discounts, photos, menus, and more; arrange restaurants in listings that cover various

themes and occasions ("Online Restaurant Reservation Landscape: Location Discovery, Table Booking, Delivery and Reviews," 2019).

Zomato Foodie Index API identifies the quality of restaurants in a particular area to help users compare locations, a great help for travellers while deciding where to stay. To calculate its Foodie Index, Zomato uses local restaurant information and user-generated content.

Zomato API can be a perfect complement to travel platforms. In fact, travel planning portal TripHobo also uses Zomato's API to offer dining suggestions based on users' itineraries. Since Zomato can suggest nearby restaurants based on user's location, it will be better position to provide real-time, spontaneous and personalized restaurant recommendations nearby. On the other hand, Yelp has a larger database of reviews and provides online reservation services, so it may be a better option to plan and book restaurants in advance.

f. Route recommendations

Not all travellers rent cars, and with the recent trend of making cities more pedestrianfriendly, especially in Europe, the use of public transport is a big part of the travel experience. As for public transport API, there are multiple options to consider:

Google APIs: Embedding Google Maps is quite common today. The Google APIs are open, well-documented and widely used. Google also offers APIs to track routes and schedules for public transport ("Travel and Booking APIs for Online Travel and Tourism Service Providers," 2019).

General Transit Feed Specification (GTFS): The API allows users to instantly configure their get-around experience by both applications providers and transit organizations that share public transport information. This API sends only static data, meaning that users can see schedules and

routes, but can not monitor disruptions ("Travel and Booking APIs for Online Travel and Tourism Service Providers," 2019).

GTFS Realtime: This extension to the primary service aims to provide real-time information on delays and schedule modifications from transit agencies ("Travel and Booking APIs for Online Travel and Tourism Service Providers," 2019).

By integrating with Google API and GTFS API, Love Travel can plan routes and schedules in advance using static data. Even better, it will also integrate with GTFS Realtime and use Google Maps data to be able to notify users about delays or schedule changes.

g. Chatbot

The Chatbot feature is for users who are not able to follow their itineraries due to different reasons or just feel like they want to be spontaneous. When looking for a place to chow down, two things can make choosing easier are location and rating. Using APIs, an application using location-aware information complemented by user reviews can be built with minimal effort. When combining with a Natural Language Processing tool, creating a powerful chatbot that can suggest real-time travel activities or nearby restaurants is feasible.

• Nearby Restaurant Recommendations

Google Places API searches restaurants in over 100 different categories, offers comprehensive information as well as reviews and photos from the database of Google Places. The API can be used to implement a functionality that enables users to locate restaurants around them via GPS ("Online Restaurant Reservation Landscape: Location Discovery, Table Booking, Delivery and Reviews," 2019).

Similar to the Google Places API, Foursquare Places API is another service to search for nearby places. However, given user permission, partners can use the Foursquare Places API to leverage data from each user's Foursquare profile, such as a list of restaurants a user has visited or places they have checked in, etc. ("Online Restaurant Reservation Landscape: Location Discovery, Table Booking, Delivery and Reviews," 2019).

• Real-time travel activities

The chatbot can be integrated with Google API to find nearby events. Then users will only need to choose an event that looks interesting to them to learn more about it, get directions, or find out where to buy tickets.

Another option is to integrate with Twitter API to find local events and activities via hashtags. Based on a user's location and the specific type of activities that the user is looking to do, the chatbot will determine suitable hashtags and run searches on Twitter, then provides the latest and most relevant tweets to help that user choose an activity of interest to them.

3. Design framework and prototype of the proposed application

3.1. Version 1.0

a. User Journey

Version 1.0 is designed for first-time users. After signing up, a first-time user will need to answer a short quiz, then a travel profile of that user will be created. The user will input information about an upcoming trip to get flight and hotel recommendations and a personalized trip itinerary. Below is an illustration of a first-time user's journey.



Illustration 2. New User Journey

b. Prototype

A prototype for a first-time user is designed based on the journey created above. The prototype takes first time user through the following to properly assess and personalize their travel needs:





Illustration 3. Prototype for first-time user

3.2. Version 2.0

a. User Journey

The user journey in version 2.0 is similar to version 1.0, however, version 2.0 showcases how the system will generate different itineraries for different types of travellers. It also undergoes major branding and design improvements.

b. Prototype

Based on the type of travellers, the application determines and suggests streamlined plans customized for the different users.



• User 1: Adventurous traveller

Illustration 4. Prototype for persona 1: Adventurous Traveller

• User 2: Urban traveller



Illustration 5. Prototype for persona 2: Urban Traveller

IV. BUSINESS DIRECTION

1. The problem

In 2017, TripAdvisor and comScore suggested that travelers make 10 to 34 website visits on average to book their trips ("2017 comScore Worldwide Path to Purchase Report," 2017). A research by Nielsen also found that travellers spent an average of 53 days visiting 28 different websites over a period of 76 online sessions, with more than 50 percent of travellers seeking travel advice on social media ("7 Travel Marketing Trends Worth Exploring in 2017," 2017). Currently, people have to spend a lot of time researching and planning for their trips, and they prefer to plan and make reservations through 'all-in-one' platforms.

There are already some apps in the market that try to unify user experience throughout the purchasing journey. However, those platforms provide generic recommendations and lack personalization to each user's preferences. From the above exploration of the challenges associated with planning, it should be evident that there is a need for an efficient online application to better cater to travellers - a one stop platform that is capable of doing it all.

2. Target market

Here below, the various segments will be explored to best determine the target market for this online application.

2.1. Gen Z

The first segment is the Gen Z, which according to a research released by Skift and StudentUniverse in 2014, the student traveller accounts for one-fifth of all global arrivals in the travel industry, with a market value of around \$320 billion ("The State of Student Travel," 2014).

2.2. Millennials

The number of travellers over the age of 30 showed the largest rise from 2007, from 10 percent of the market to 17 percent (Reynolds, n.d). When it comes to the travel sector, the power of Millennials is no different than in any other category. In 2015, 82 percent of millennials took a vacation versus 75 percent of all U.S. consumers (Birkner, 2016), 72 percent also state they are willing to increase their spending on travel experiences versus physical objects ("Millennials, Fueling the Experience Economy," n.d).

2.3. Gen X

According to HomeAway.com, Gen X travellers, born between 1965 and 1980, are going to take the most leisure trips; they account for one out of every three leisure travellers (Reynolds, n.d).

2.4. Baby Boomers

According to a report by AARP summarizing the travel trends of Boomer, it is anticipated that seniors (age 50 plus) will take 4-5 leisure trips in 2019 and spend more than \$6,600, mostly on cruises. For those going abroad, 31 percent booked their 2019 journeys by September 2018, up from 23 percent by September of the past year in 2018 and 17 percent by 2017 ("2019 Boomer Travel Trends," 2018).

Based on the statistics above, Love Travel's primary target audience will be Gen Z and Millennials as they have the strongest buying power with a high market value. Furthermore, they are also very tech savvy and open to new technology that can enhance their travel experiences.

3. The solution

Love Travel is an all-in-one application that allows travellers to plan and book their trips based on their travel habits and preferences. Love Travel provides a unified user experience across multiple platforms and simplify the process of planning and booking a trip. With the userfocused design of the platform, travellers will be able to save time, lower their stress, and feel confident about their upcoming trips. Using AI and ML, Love Travel will provide users with complete personalized itineraries and relevant recommendations, all in one place.

V. CONCLUSIONS AND NEXT STEPS

The amount of data stored on the Internet has increased exponentially over the past decade, and one of the most important challenges is how the available data can be used to obtain satisfactory results in problem solving. (Etzioni, 1997).

Today, AI is not simply a research topic but also becoming an important subject of academic teaching, industrial and commercial applications (Weiss, 1999). There are already some studies that examined the feasibility of using algorithms to create an intelligent recommendation system to support a leisure traveller in selecting a tourist destination, bundling a range of products and drawing up a travel plan by integrating data and information originating from external, already existent, tourist portals (Ricci & Werthner, 2001), or combining collaborative filtering with content-based recommendations and customer demographics to suggest package holidays and tours (Schiaffino & Amandi, 2009).

However, there are certain challenges that will need to be overcome in order to make an automated travel planning system possible. For example, since users can discover nearly any type of data via the internet, the system will need to create methods of packaging data to make it more useful to users. A portfolio of potential experiences will also need to be created by destination-based companies and matched to the experiences a user wishes. All this will require not only technology, but extremely skilled employees who know how to use the technology to add value to the user's travel experience (Yu & Schwartz, 2006).

Although there are challenges ahead, the travel and tourism industry is already taking advantage of the technology advancement. Travel companies have started to adopt robots, AI and service automation in the form of chatbots, delivery robots, robot-concierge, conveyor

restaurants, self-service information/check-in/check-out kiosks, and many others (Ivanov & Webster, 2017).

This reiterates the need for an online application such as Love travel to be an efficient one stop travel application for Gen Z and Millennials. It is able to aptly customize and provide personalized experience tailored to meet the needs of all types of travellers, from adventurous to urban travellers. It utilizes AI to heighten and enhance the travel experience, expedite the planning so the users can travel more frequently and efficiently. Although there are other applications on the market, none of the are able to cater to user needs in a unique manner as Love Travel potentially could. With other major partnerships with the diverse travel companies, opportunities presented with the online application are poised to grow and enhance the overall user experience.

It is vastly apparent that the market has much proven potential, and upon completion of this project, I want to keep developing the idea and conduct more interviews to confirm the problem, the product market fit and refine the solution to be able to meet prospective users' expectations better. Once the product market fit is confirmed, I will start to build an MVP, create a detailed business plan and marketing strategies to introduce and promote the product to travellers in Canada.

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