Advanced Route Optimization using Hybridized Salesforce Geopointe Package

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Abstract. The study explores how Geopointe, a route optimization tool, affects the effectiveness of industrial supply chains and proposes a novel method for route optimization that is used in the IT industry. Outdated solutions have been retired as Google Maps and its API have been improved. Route optimization is the process of determining the fastest and most economical path for your distribution network between nodes. By improving routes, both the productivity and environmental impact of mobile workers will increase. Along with route optimization, these two-technique based API will be compared to other methods, like Salesforce and Geopointe tool, etc., to evaluate performance, expense, and carbon emission. Numerous optimization technologies, including Geopointe, Map Anything, Amazon, etc., are contrasted in the article to investigate the delivery and cost function difficulties. All sectors must have a strong supply chain, and route optimization technologies, which are utilized by many different businesses and include ERP, Salesforce, NetSuite, and others, may address this issue. This article uses a useful method to assess the impact on IT sectors.

1 Introduction

One of the areas of traditional computer science and modern business that is expanding at the fastest rate is cloud computing. In response to the on-demand availability of data resources, it offers a wide range of alternatives. As a result, a growing number of companies have decided that storing their data on the cloud is the best option for route delivery.

As an innovative company without a service management computer system, consider the IT business consulting industries, which work on a variety of projects. In this paper it is examined, the salesforce-based supply chain method in this article. Among the many ideas that make up the concept of trip optimization is finding the shortest route between two points [1]. The process of internally determining the most effective route between several stops while considering significant factors including booked appointments, traffic windows, shift durations, distance, and other similar variables is known as travel optimization. The optimization engine that powers the Salesforce Maps application was created to address a variety of problems.

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As an innovative idea without a service management computer system is useless, consider the IT business consulting industries, which work on a variety of projects. We'll examine the salesforce-based supply chain method in this article. Among the many ideas that make up the concept of trip optimization is finding the shortest route between two points [1]. The process of internally determining the most effective route between several stops while taking into account significant factors including booked appointments, traffic windows, shift durations, distance, and other similar variables is known as travel optimization. The optimization engine that powers the Salesforce Maps application was created to address a variety of problems.

1.1 AIM

The goal of this study is to enhance the supply chain process in the IT sectors. The initial objective is to create an approximation approach to improve the current procedure. By providing a more precise estimate of the resources needed, such as time, fuel, and carbon emissions, this strategy will assist firms in better planning their supply chain activities. The reduction of fuel usage and carbon emissions is another important goal of this article. Businesses must embrace sustainable methods that reduce their carbon footprint because of growing environmental concerns. Organizations can cut fuel use and, as a result, carbon emissions, by optimizing their supply chain routes.

The final goal of this article is to enhance e-commerce operations by implementing a new IT procedure. To get products to their customers, e-commerce companies primarily rely on their supply chain system. Organizations can improve their E-commerce business and offer a better consumer experience by streamlining the supply chain process [3].

The report also compares and analyses the effects of various IT solutions for route optimization. Numerous IT products on the market today can assist businesses in streamlining their supply chain paths. The report in [4] can help firms identify the right solution for their unique needs by comparing various tools and demonstrating how they affect the supply chain process.

The main goals of this article are to enhance e-commerce, reduce carbon emissions and fuel usage, and compare the impacts of various IT tools for route optimization to improve the supply chain process in the IT industry. By achieving these objectives, businesses may improve their supply chain process while also enhancing corporate operations. The essay is made up of four main parts. The study effort is summarized and background knowledge on the various issues is provided in Section I. In Section II, we'll discuss the associated work and how the evaluation was received to set the stage for subsequent work [5]. In Section III, we explain the project's structure as well as the recommended approach and methodology. Section IV contains a description of the experiment and the results it generated. The essay's fifth section makes some recommendations for the future direction of the planned effort. The four sections clearly establish the procedure for this paper.

2 Related Work

The software focusses on electric vehicles and regular vehicles. It accomplishes this by making use of the routes, mainly at night. The shortest path this technology, which enables drivers’ stationary equipment and moving automobiles, presents safety concerns. In [6], an efficient non-radiative energy transformer known as Geopointe is researched. Salesforce is based on "strong coupling" between two vehicles that are physically separated by medium-range distances. Here cost and carbon emission are compared with electric vehicles. Hence, pulsations in the grid supply and the vehicle battery, however, can be brought on by systems based on inductive connection between the grid and a moving automobile. This may improve the quality of the vehicle and help the environment by giving less carbon emission.
The integration of dynamic multi-swarm particle exploring capabilities is the main application of the mixed swarm intelligence optimization approach and Geopointe uses Swarm methods. They can also alleviate traffic congestion and minimize exhaust gas produced during vehicle transportation. Urban environmental protection becoming a reality, etc. Because of this, network analysis, computer applications, operational research, transportation, and applied mathematics have all been interested in the route optimization problem of logistics distribution trucks. Many academics, both domestically and internationally, are now studying it. It is widely employed in computer applications, communications, industry, national security, and biology. The truck routing issue in logistics distribution will be the main topic of this paper. An integer programming and combinatorial optimization issue is the vehicle routing problem (VRP). Additionally, it relies on determining the shortest path between two nodes. On the other hand, this optimization is more focused on the points and the positions.

2.1 Salesforce activity

On the software as a service platform that we would use to develop the application, many different enterprises and organizations would be able to handle a vast array of items. One of the well-known CRM Platforms, Salesforce, is used to manage customers and their connections with an organization [6]. To handle customer encounters over the phone, we would utilize Salesforce. Figure 1 depicts the entire process. Below the route optimization is chosen by 16 players and the 16 members are routed in correct with the optimization process, which is then replicated in the methodology.

![Activity diagram for salesforce route optimization](image)

Salesforce is one of the most well-known CRM platforms for managing clients and their relationships with an enterprise. Organizations can connect with their customers by using cloud technology [7]. Its flexible features can also be used by large inventory systems. We would build an application on a platform based on software as a service to manage many products for various enterprises and organizations [8]. The CRM model is used in many businesses to manage customer interactions that happen over the phone, via email, in person, at meetings, etc.
2.2 Controllers

Below is the cloud architecture of the salesforce. The Apex classes serve as controllers for the Visualforce pages, as shown in the below controller. Apex is salesforce language to code and visual force is web interacting component. As we can see in the below figure the developer builds the metadata and is uploaded with the help of apex on the internet, which is then sent to the apex compiler which is in the server and all the necessary classes are in the data storage. These are cross compared with Apex runtime and the server processes and returns the data to the internet server which is processed by the end user. The most popular heuristic approach, known as the progressive technique, uses Google Maps to gradually align the nearest pair to provide the optimal path [9,10]. The created routes may get stuck in local optima because of this strategy's greedy nature [11]. The main disadvantage of this tactic is that. This means that errors would be hard to fix even if they were produced after additional sequences were added to the route-finding process. The controller with all the compilers is seen in the image below.

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![Fig. 2. Geopointe Map [23]](image)

![Fig. 3. Control Architecture [23]](image)
2.3 Controllers

Model-View-Controller (MVC) architecture is used in applications created on the Salesforce platform. This architecture maintains the separation between the three tiers of the system, making system maintenance simpler and increasing adaptability [12]. The model is provided in these Apex classes, bespoke objects, or standard objects. After being rendered on the server, the Visualforce pages and other components that make up the View layer are the ones that are shown in the web browser. The logic (controller) layer can be modified by programming its definition in Apex classes or triggers, or it can make use of the platform's standard controllers [13]. It also includes actions like storing, cancelling, and somehow connecting the object to the website's input fields. Figure 5 shows how Salesforce [14] implements the MVC model.

3 Methodology

3.1 Vehicle route formulation

The author of this study suggests a three-step process. Use Geopointe to create, plan, and carry out your trip arrangements. All localizable info (Salesforce, Google, or any address) can be used to create routes [15]. Get Google directions, manage up to 100 stops per route, and even optimize travel. Everywhere you use Salesforce, you may access saved routes. Geopointe Route Planner is a great tool for multi-day route planning and is great for planning pauses weeks and months in advance.

The following problem situation was looked at. A collection of m qualities is provided.

\[ G = G_1, G_2, ..., G_m \]  

where each component \( G_i \) being a set of

\[ S_i = \{s_1, s_2, ..., s_f\} \text{ of } q_i \]  

\[ C = \{c_1, c_2, ..., c_k\} \text{ of } q_i \]  

The suggested approach uses a Rule of generic to growing strategy and employs a systematic wrapping method as its foundation. Class is established beforehand, as opposed to the original ant-miner technique [3], which is derived generated from classification models. The \( k \) classes are ordered according to how common they are (the percentage of labeled examples that are users of a certain subclass). For all \( k_0 \) classes, rules are taken out sequentially from the training data set's examples.

3.2 Vehicle route formulation

According to the literature, travel optimization is a process that involves visiting every place while completing the shift in the most efficient manner possible to ensure that all appointment times are met. However, it does not focus on minimizing the travel time between places, which may result in longer overall travel durations [16]. To optimize travel based on the fastest route, the approach of Least Windshield Time is recommended. It is noteworthy that the default setting for most users is Fastest Shift Completion.

The above algorithm shown in figure 4 shows the input parameters initialized with the industrial datasets. Once the industrial datasets obtained from Solomon benchmark are analysed they are fed into the routes which are pre-computed and then computed only if the
routes are proper and feasible. If the route dataset is appropriate, then the data is fed into the Salesforce-Geopointe package as shown in the above figure 4. Then path optimization is performed which uses the Ant colony method to form path formation. The pre-processed data sets are computed here which are based on random routing path. Hence these are randomized to establish routing probabilities. The entire process is repeated until the best path is established [16,17]. If the system does not identify the best path, it is re-fed back to the route and parameters are recalculated.

![Salesforce and Geopointe Flowchart](image)

**Fig. 4.** Salesforce and Geopointe Flowchart
If the best path is found, it is then finalized and fed to the google map systems. Once the google map analyses it is calculated and fed to the routing system for the drivers to deliver the packages [18]. Below a fastest shift completion method is analysed based on the business hour timings. Any Salesforce application has a heterogeneous distributed structure, as the name suggests. It means how the same Force.com services and tools are available to all platform users. Additionally, any Salesforce user may profit from the customization made just for them on the platform. Salesforce also uses infrastructure that is driven by metadata. All platform customizations, including page layouts, object definitions, workflows, processes, and Apex code, are preserved with metadata. No tables are created in the Salesforce database, in contrast to traditional relational databases. The code for the triggers and Apex classes is also not compiled. As an alternative, the system engine builds virtual apps while they are running [11].

### 3.3 Fastest shift completion.

Reducing the amount of time, a vehicle needs to drive between each destination is the goal of travel optimization. It will ensure that all appointment timings are observed [19]. The Salesforce Maps optimization engine looks at traffic windows for all journey optimizations. It is important to be aware that this type of optimization may include idle hours at locations to prevent vehicles from idling in areas with heavier traffic (ex: 9:00am - 6:00pm). If you want to finish your shift as quickly as possible and/or minimize idle times, it is recommended that you use Fastest Shift Completion.

### 4 Results and Discussion

Below are the list of stops for route page, here we take stops off the list, and rearrange the stops in the list to suit your preferences. It specifies the times for entry and exit for your routes by inputting time values. The results are improved by comparing cost, fuel and emission of carbon. As we can see salesforce with Geopointe has yielded the highest results. This has proved to be the best route optimization software.

<table>
<thead>
<tr>
<th>Tools</th>
<th>Cost</th>
<th>Fuel</th>
<th>CO₂ Emission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salesforce</td>
<td>31.6</td>
<td>3.1</td>
<td>33/15</td>
</tr>
<tr>
<td>Geopointe</td>
<td>31.3</td>
<td>4.6</td>
<td>32/25</td>
</tr>
<tr>
<td>Salesforce – Geopointe</td>
<td>38.9</td>
<td>4.3</td>
<td>34/13</td>
</tr>
<tr>
<td>Map-Anything</td>
<td>29.7</td>
<td>4.5</td>
<td>31/16</td>
</tr>
<tr>
<td>G-Maps</td>
<td>16</td>
<td>5.7</td>
<td>31/13</td>
</tr>
</tbody>
</table>

By using the "Optimize Route" option, you may also instruct the program to organize your stops in the way that will save you the greatest time and effort. The driver may decide whether you wish to walk, drive, bike, or take the bus as your means of transportation. The driver has the flexibility to choose any route way for the route process. In the below results, hybridization of salesforce-Geopointe yields highest results.
By utilizing this option, you may search any Data Set that is listed in the Saved Layers tab. Like Salesforce reports, each Data Set has the ability to be filtered and is only available for a certain item. You might have received some from your administrator. Browse the Data Sets page to learn how to create and update your own sets.

![IT tools comparison](image)

**Fig. 5.** IT Tools Comparison [23]

As the quality of the rule improves, each ant in the ACO algorithm (shown in Fig. 2) will produce a new rule by adding each word one at a time. In term selection, the SA algorithm is applied to optimize the selected phrase. The SA algorithm is impacted by the temperature. The temperature gradually decreases over a slow course from a very high beginning point by a factor of a preset threshold value. The addition of terms will end when the temperature falls below a lower limit temperature that indicates there are no more words that can be added.

Figure 5 compares several IT tools and demonstrates that hybridized IT products are the most effective. A loading progress bar will appear right beneath the name of the Data Set when you click on it to let you know that it is loading. Figure 6 and 7 shows the optimized routes in Geopointe tool. The blue bar will disappear after it has finished loading, and the map with the search results should appear. Figure 5's comparison of IT tools is shown in Table 1. Finally, the optimized optimal path is displayed in Salesforce when Geopointe is deployed as an app exchange package, as seen in Figure 6. The aforementioned items make use of ant colony optimization parameters that relate to the Google Maps API. As seen above the above results are produced in the Geopointe tool, the ACO results are fed into the Geopointe tool and analysed. In the end, the Figure 8 shows the optimized geo Mapped result. The optimal path at the end of the iteration is given to the tool. If the successful path is established, the route is formed if not a new iteration is performed until the best path is formed.

The concept discussed above shares similarities with the Ant Colony and Swarm Optimization methods, which are commonly employed for route optimization. However, unlike these methods, it utilizes real-world tools and datasets to generate results.
Fig. 6. Geopointe result Case 1

Fig. 7. Geopointe result Case 2
These papers aid in cross-verifying real-world outcomes with the theoretical analysis conducted in academia, thereby ensuring the success of the method and facilitating comparison with other successful techniques. Furthermore, the application of simulation results in the real world is enhanced using authentic real-world results.

Computer optimization technique called Ant Colony Optimization (ACO) takes its cues from how ants gather food. ACO is commonly used to resolve combinatorial optimization problems like the traveling salesman problem, where the goal is to find the shortest path that makes several stops [20]. The Geopointe software allows users to perform geographical analysis and visualization on their Salesforce data. Geopointe uses Google Maps to display data on a map and provides tools for doing calculations and enquiries based on location. Salesforce is used for route optimization here, which has produced results from the industrial datasets obtained by real world firms. By comparison with the real-world results, the results are practically applicable in the world. Salesforce provides users with tools for managing sales, marketing, customer service, and other functions as well as the opportunity to customize their workflows and automate procedures. These results enhance in results production. When Geopointe, Salesforce, and ACO are connected, a hybridized model is produced. The benefits of all three technologies are combined in this concept. Salesforce administers the SOQL (Salesforce Object Query Language) query, which users may use to access data from Salesforce [21].

5 Conclusion

Geopointe uses Google Maps to display this data on a map, allowing users the chance to do spatial analysis and discover more about their data. ACO may then be utilized to enhance routes or other procedures based on this knowledge, providing the user with greater value. ACO, Geopointe, and Salesforce may collectively provide a potent solution for businesses looking to automate their procedures and learn new things about their data. The integrated
output that many systems offer allows for better decision making and more efficient execution of tasks.

References


