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Determining Driving Routes that Match User Preferences, Equipment, and Experience

ABSTRACT

Drivers who lack the appropriate equipment or experience to traverse road segments with adverse conditions benefit from ensuring that their route does not pass through such segments. Else, they risk being stranded or rerouted to avoid the problematic road segments. Current routing techniques do not take into account such factors. This disclosure describes techniques to determine suitable driving routes that avoid adverse conditions, based on a user's request, and based on information regarding vehicle capabilities and equipment availability. The routes are obtained based on combining such information with other relevant data, such as weather, terrain information, likely time of travel along a road segment, schedules and alerts for construction and closure, etc.

KEYWORDS

- Navigation application
- Digital maps
- Road closure
- Unsafe road
- Driving safety
- Routing
- Driving directions
- Vehicle capabilities

BACKGROUND

During their drives, motorists may encounter a number of dangers or obstacles, such as snow-covered or flooded roads; closures or detours due to weather, construction, or other reasons; etc. Such issues can be especially dangerous for drivers who lack the experience and necessary driving expertise or appropriate equipment (e.g., correct type of tires, snow chains, engine, etc.) to deal with these difficulties. Even experienced drivers can find these situations problematic if their vehicles lack the capabilities and equipment to deal with the adverse

conditions. For instance, heavy snow in mountain areas may require a combination of four-wheel drive, snow tires, chains, etc.

Drivers who lack the appropriate equipment or experience to traverse road segments with adverse conditions benefit from ensuring that their route does not pass through such segments. Else, they risk being stranded or rerouted to avoid the problematic road segments. Conversely, those who possess the right equipment and experience may prefer a route with adverse conditions if it can bypass alternate routes that do not present adverse conditions but have heavy amounts of traffic.

However, routing in current navigation applications does not take into account potential adversities along the route at the time of travel. For instance, if a road that is open at the start of the drive is likely to be closed at the time when the driver is likely to reach that point along the route, the required detour can add a substantial amount of time or distance that could have been avoided by selecting another route at the outset. Moreover, routing in current navigation applications does not take into account vehicle capabilities, equipment, and driver experience.

DESCRIPTION

This disclosure describes techniques to augment routing suggestions within navigation applications based on user preferences for avoiding various adverse conditions and user input regarding vehicle capabilities and equipment availability (e.g., four-wheel drive, chains, snow tires, etc.). For example, users can indicate that they wish to avoid unplowed roads so as not to drive through snow.

The routing suggestions are generated by combining the user-provided information with other relevant data, such as weather, terrain information, likely time of travel along a road segment, schedules and alerts for construction and closure, etc. The generated routing

suggestions avoid road segments that are likely to present adverse conditions that do not match the user's preferences, vehicle capabilities, or equipment. For instance, mountain passes can be avoided during snowy conditions if the user's vehicle does not have chains. Similarly, the routing can be generated to bypass roads that tend to get closed during bad weather, such as heavy rains, fog, etc., by favoring routes with road segments that have a lower likelihood of closing.

Alternatively, or in addition, the suggested routes can include information about adverse conditions likely to be encountered along the route along with the vehicle capabilities and equipment recommended to pass safely through the segment. For instance, routes that go through mountain passes during snowy weather can be marked as likely to require chains. The user can then decide whether to take chains and use the route or can choose another route that does not require chains.

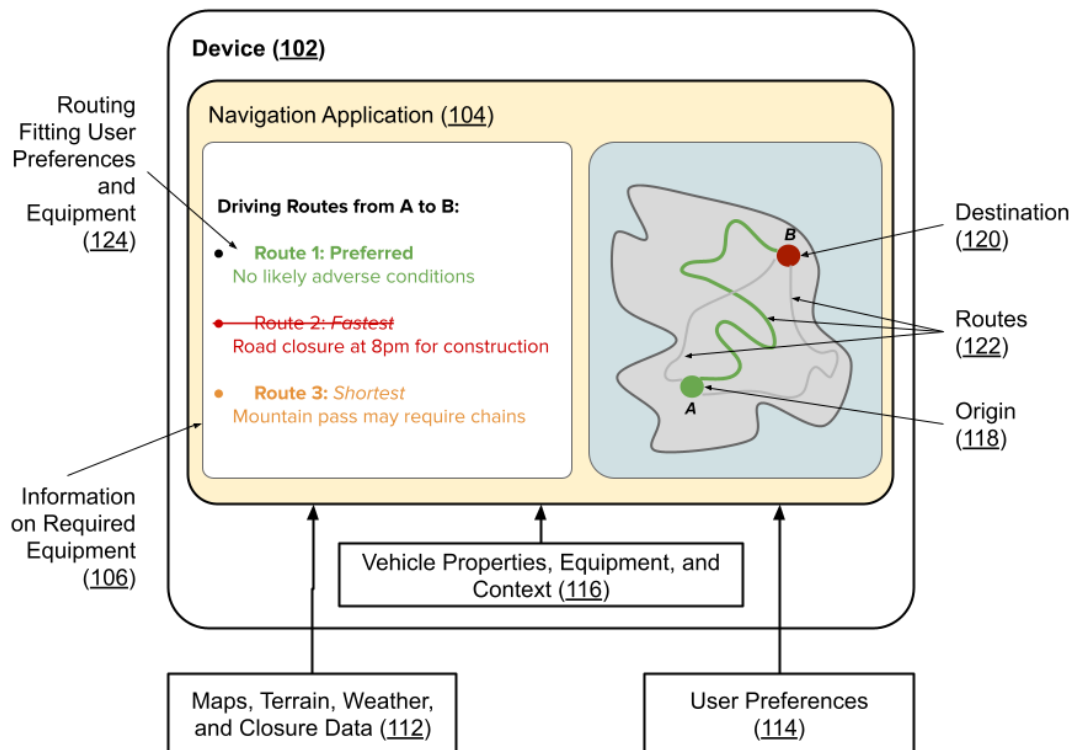


Fig. 1: Generating routing suggestions that avoid routes with adverse driving conditions

Fig. 1 shows an example of operational implementation of the techniques described in this disclosure. A user of a navigation application (104) on a device (102), such as a smartphone-based digital map and navigation application or an in-vehicle navigation system, seeks routes to go from an origin (118) to a destination (120). Suggested routes (122) are generated by taking into account the user's preferences (114) for adverse conditions that are to be avoided, along with the vehicle capabilities, equipment, and relevant context (116), such as location, speed, etc.

The information regarding user preferences, vehicle capabilities, equipment, and context is utilized together with data about maps, terrain, weather, and road closures (112) to generate the most suitable routing suggestion (124). In addition, the user is presented with additional routes that do not fit the constraints along with relevant information (106) about equipment that is recommended for safely traversing the route. For instance, as shown in Fig. 1, the user may decide to take chains for the trip to be able to take the shortest route.

The techniques described in this disclosure can be implemented in any application, device, or platform that provides routing suggestions for navigation. In addition, the features can be made accessible to other parties, such as developers of third-party applications, via suitable mechanisms, such as Application Programming Interface (API), Software Development Kit (SDK), etc. Implementation of the described features enables users to obtain routing information that avoids potentially unsafe, uncomfortable, or inconvenient segments that do not fit their preferences, equipment, or experience, thus enhancing the user experience (UX) of navigation applications.

Further to the descriptions above, a user may be provided with controls allowing the user to make an election as to both if and when systems, programs or features described herein may enable collection of user information (e.g., information about a user's location, a user's vehicle, a

user's preferences, or a user's current location), and if the user is sent content or communications from a server. In addition, certain data may be treated in one or more ways before it is stored or used, so that personally identifiable information is removed. For example, a user's identity may be treated so that no personally identifiable information can be determined for the user, or a user's geographic location may be generalized where location information is obtained (such as to a city, ZIP code, or state level), so that a particular location of a user cannot be determined. Thus, the user may have control over what information is collected about the user, how that information is used, and what information is provided to the user.

CONCLUSION

This disclosure describes techniques to determine suitable driving routes that avoid adverse conditions, based on a user's request, and based on information regarding vehicle capabilities and equipment availability. The routes are obtained based on combining such information with other relevant data, such as weather, terrain information, likely time of travel along a road segment, schedules and alerts for construction and closure, etc.