**Developers Information:**Project Title: Transit – Route of Buses in Karachi Authors: Amin Shiraz Gilani, Sumbul Zehra, Anusha Fatima, Ukasha Rafiq and Ambreen Abidi Instructor: Rahim Hasnani  
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**Project Description:  
Transit –** a web based application service developed by a group of individuals. It offers route planning for travelling by a public transportation (Buses). Transit offers an API that allows maps to be embedded on third party websites and offers a locator for urban businesses and other organizations in different locations of the city. Furthermore, the application allows users to collaboratively expand their services of public transportation.

Transit provides a route planner given the locations one needs to get picked from and dropped to. It suggests the shortest possible bus route, in terms of distance, from a source to a destination. If the user’s current location is not a bus point, it also guides as to which bus point would be the best to get to take a bus from.

**Implementation:**The basic functional requirement was the generation of the guidelines of the busses to be taken. This was divided into two simpler tasks: the generation of the shortest path from the source to the destination and the mapping of this shortest path to the routes of busses. But before these tasks can be worked upon, some pre-processing was required. Firstly, it was difficult to find a library that had detailed and accurate coordinates data available and had no query limits. To resolve this issue, web crawling techniques were used along with Google’s geocoding library.

The shortest path of the journey was calculated using the graph methods of networkx. First, a weighted graph was constructed from the gathered location data and generated coordinates data. Then, an internal method of networkx was used to output the shortest path.

After knowing the shortest path, it was mapped to the combination of all the relevant buses and the combination which used the least number of busses was selected. This was done using a well-known algorithmic technique called dynamic programming: the final route was mapped based on the results of the sub-maps already formed instead of enumerating over all the possible routes. The time taken to output the best bus guide was immensely reduced.

A feature of this project is that it allows arbitrary source and destination locations (as long as they are within Karachi). If the given inputs are not in the set of bus points, the closest bus point is calculated and the user is asked to walk to (or from) the calculated point.

**Deprivations:**The map API does not show the actual street views of Karachi because the Google Map API is not imported. The reason the app shows a straight route is because it does not offer [satellite imagery](https://en.wikipedia.org/wiki/Satellite_imagery), street maps, 360° panoramic views of streets, real-time traffic conditions.

It was assumed, for the sake of this project, that straight line distances from two points on a map approximate the actual road distance. The shortest path algorithm was then applied to the straight line distance rather than the actual distance. Secondly, the map drawn to guide the traveller also contains straight lines.

For simplicity’s sake, it was also assumed that the busses only stop at their points and one cannot take a bus from the middle of two points, which is quite contradictory to the current system of Karachi transit. Ideally, the points system must be structured and our assumption must be true. Nor the buses waiting time neither the cost of any journey was considered in the identification of the shortest paths. Only the distance between the source and the destination was given the priority.

Also, there is a lack of customization and extensibility, where the user can add photos and memories from the place he visited and add features to the desktop based app. We look forward to work and develop this project on a large scale. These features were not catered because of the lack of time and work load of the semester.

**Contact:**For feedbacks, suggestions, complains and/or help please email . Thank you.

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