*METHODOLOGY*

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*GEOGRAPHIC INFORMATION SYSTEM (GIS):*

A geographic information system (GIS) is a framework for gathering, managing, and analyzing data. We used QGIS. It is a free and open-source platform that supports viewing, editing, and analysis of geospatial data.

Specific steps which we used in GIS while mapping was:

1. **Collecting Base Maps**- we downloaded desired toposheets from the survey of India website for our district Puri, Orissa.
2. **Georeferencing a topo sheet**- Then we took those digital images of map and assigned it real world location by adding latitude and longitude coordinates to it. This will ensure us that we are digitalizing the map into correct location and its practical use is also possible.
3. **Creating a Shape File**- after all digital images are in place, we started creating various shape files for both road and drainage network. For roads & railways we used line Shape and traces the network, but for waterbodies such as rives we used Polygon Shape.
4. **Sheet Composition**- the last step after completing the digitalization of map was to compose our sheet into desired format and style by adding North, Scale and Legend into it. This would make our maps more informative and easier to understand.

The Indian Space Research Organization is the national space agency of India. ISRO is the primary agency in India to perform tasks related to space-based applications, [space exploration](https://en.wikipedia.org/wiki/Space_exploration) and development of related technologies. There are various sources to extract ISRO data for mapping which includes: BHUVAN, VEDAS, MOSDAC, etc. For our purpose of making a Road & Drainage Network Map, we have specifically used BHUVAN data the most. BHUVAN is an Indian web-based utility which allows users to explore a set of map-based content prepared by ISRO. We have then taken the use of Topo Sheets from Survey of India. Topo sheets are maps which have a large-scale detail of various data including both natural and artificial features.

One of the major complexities involved during mapping was that to extract the required data from these topo sheets. As topo sheets include information such as: Forest, contour lines, various hierarchy of mettled and un-mettled roads, railways, canals, drains, temples, etc. It was a huge amount of physical hard work in extracting road and drainage network from these sheets and then digitalizing it.

*APPLICATION*

A road network map generally shows various types of roads including, Express ways, National & State Highways, Main roads, Local streets, etc. These maps help common people route to their destination. It also plays a significant role for town planners and in the process of urbanization. Even drainage network map helps urban planners to see the flow and direction of natural pattern of various water bodies. And to make all this possible GIS is the best tool which can be used.

