Methods And Techniques to Visualize Geographical Data

The conventional methods of visualizing geographical data have been based on 2D maps, whether they were hand drawn or are digital maps. Previously when GIS did not exist, people used to draw with maps with their hands. Then the trend moved on to GIS where digital maps replaced hand drawn maps which were much more accurate and more meaningful then hand drawn maps. There have been several categories in which these 2D digital maps lie under. Starting with Chloropleth Map which show data in colors and shades indicating the severity of something, Heat Maps Represent large dataset using color spectrum, Dot Maps display the presence of a phenomena using dots and Bubble Maps in which data is shown in the form of bubbles which depend on the size and color of the variable. These are some of the 2D digital maps categories.

In recent years there has been a shift towards representing the geographical data in a 3D perspective as well. There are several reasons which lead to this being seen as an important addition. 2D maps require the user to build a concept, a meaningful model inside their minds. 3D on the other hand gives an option to the user to recognize changes in elevation that's why they enable better understanding. 3D visualization is helpful in many areas and to many individuals such as Civil engineer, water resource engineer, urban planners, geologists etc., to understand and analyze sub-surface information. Despite of 3D displays becoming more and more popular, still a lot of work is to be done in 3D visualization of geographical data.

As the field of cognitive science grew, it gave a trend to sketch maps. This also included having exercises in which first the sketch maps were prepared and then compared with the metric maps. Sketch maps for many reasons are useful and have some limitations as well. Sketch maps are more intuitive for users, handle imprecise input from user and require less technicalities. Sketch maps are often used in human-to-human communication as they are easy to produce and express spatial knowledge. Sketch maps reflect user's spatial knowledge that is based on observations rather than on measurements. Hand-drawn sketch maps have been extensively used to investigate how humans memorize spatial knowledge. Users would find it more interesting to work with something they have prepared themselves. Looking at the positive side, there should not be forgotten that there is a shady side as well. sketch maps omit, regularize, and exaggerate information, and use inconsistent scale which leads to different kinds of errors/lack of precision in sketch maps. Having these challenges, it is an interesting exercise to compare sketch maps with metric maps.

SVGs are also becoming common now when showing some drawings or figures on a webpage. SVGs are drawings in vector format which means no pixels. SVG canvas is of infinite dimension where the SVG is drawn but it is actually seen inside a viewport, so it's like you are viewing a scene from the window. SVGs can be established by providing width and height at the root SVG element. Viewport coordinate system is also known as viewport space. Its origin is at 0,0 top left of the screen. Positive x values move to the right and positive y values move down. Then there another coordinate system involved that is the User coordinate system also known as user space that has its origin at 0,0 top left and initially it's the same as viewport coordinate system. Viewbox attribute is used to manipulate the user coordinate system. Viewbox will define a new user space and this user space will define what units mean in the SVG document. We divide

viewport width and height with the viewbox width and height to know how many units correspond to how many pixels.