Remote Sensing and GIS for Rural Development
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Week 7
Lecture 01
Creating shapefiles from georeferenced maps

Hello everyone. Welcome to NPTEL course on Remote Sensing and GIS for Rural Development. This is week 7, lecture 1. We have now completed half of the course and the rest of the half will focus most on getting data and then applying it to case studies. We will do two more lectures on how to access remote sensing data and then make it available for your analysis on rural development.

We have been covering multiple softwares and platforms, so it is important to know more about these platforms and softwares through external sources and through these lectures. Consider these as an intro and those who would like to have more information are welcome to search for these NPTEL or open source tutorials and makes uses of it. Let us dive into week 7.

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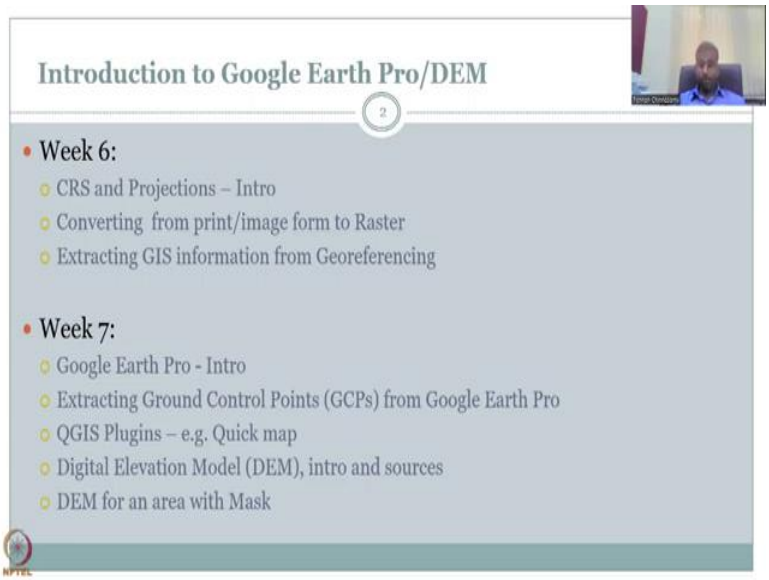

In week 7, first, let us look at what we covered in week 6. So we had looked at coordinate reference systems and projections, an intro. We looked at different types of coordinate reference systems, CRS and projections, especially the UTM projection which is suitable for India. And then we looked at how to search them in QGIS. We also looked at methods to convert from one to another system.

We also looked at importing print and imageries into Rasters. Print and imagery do not have a geo-spatial location. When they are converted to Rasters they automatically get a location. However, there are steps for that and that is what we used the tool georeferencing or geo-referencer. Once we geo-reference the image, we went into extracting GIS information from georeferencing tool.

We could call this as data mining, because you are mining for data, you are digging deep into a set of data and creating new data. New data as in the emerging couple of informations together and then getting out some data. So with this information we will go into week 7. You would have noticed that in week 6 there was considerable use of Google Earth Pro. So I thought it was appropriate to have one lecture as an intro for Google Earth Pro.

There are multiple tutorials available for this and even Google's tutorials are available. However, it will be good to have our own NPTEL lecture on it. We are just going to do an intro, so it is just being one lecture of 30 minutes and you will have a good hold of, at least the Google Earth Pro tools that are important for rural development. It keeps updating, so you will have to keep on updating the knowledge about this product and use the tools wisely.

Then we will look into extracting ground control points GCPs from Google Earth Pro, which is another way of taking control points if your map does not have it or an image does not have it. You would have remembered that in the previous lecture we used the map and on the map there was lat, longs; so we use that value in the map for GCPs - Ground Control Points. Suppose your map does not have it or you are taking an image from plane.

So those do not have the lat, long boundaries, so how do you know which one, where to ground, hold these images. So that is where you can extract from these locations. Let me go into QGIS plugins, especially the quick map services. This is an example I will give to show how you could, instead of going back and forth between Google Earth Pro and QGIS, you can have some tools embedded in QGIS that can help you quickly access data.

We will also look into digital elevation models, what are they, an intro, and sources for digital elevation models with one hands-on exercise and mapping using DEM, so digital elevation models are very important for rural development because it captures the elevation gradients and with the elevation gradient you know where the water flows, where the roads could be constructed with less budgets, where can you have better connectivity, both transportation and communication and rescue operations during climate disasters.

All these, the elevation model is very important. A model is a data here because it gives you the output as a elevation profile, which you will be using for further analysis. So we will talk about DEM in detail in one lecture and then in another lecture we will show you how to download a data from open source and then use a shape to extract what your part is. Most of satellite data, if not all, are global coverage.

So you will have to extract the information to your location. We have already covered the tool in mask, in our Raster tools, but here we will use it and we will show you how to make a map out of it.

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So let us go ahead and while we are looking at these tools you can also extract Excel sheets or tables into QGIS if you know the X, Y locations, which is the lat, longs. There is a good tutorial on this on QGIS website, which gives links to these tutorials. So please go ahead and look at this tutorial, which also has a data for you to practice.

Basically you can take observation data in a tabular format and attach it to the QGIS software if you know the locations. A classic example is the location of schools. If we know the number, the name and the location of schools, the X, Y data, then we can plot them on a map, once you plot them you know how far it is from the hamlets, how far kids have to spend time to get quality education and how that impacts their learning and or nutritional status.

Suppose you have to walk three hours to go to school at a young age, most of your energy is gone by the time you go to school. So what are you going to listen and take back? It is a

pretty hard life for people in those areas. Again I would like to recollect it from my own family's experience, they had to walk long distances to go to schools and colleges that definitely has an impact on your learning abilities.

Because by the time you reach you are drained and the food is also not as nutritious. If you can afford nutritious food, you can definitely afford a bus ride or a cycle. So if you gel all these things together, rural development is not one just one concept. There are multiple concepts you need to address for effective rural developments. So let us get in. This I would do if we have lectures needed, but as I promised let us get into the Google Earth Pro.

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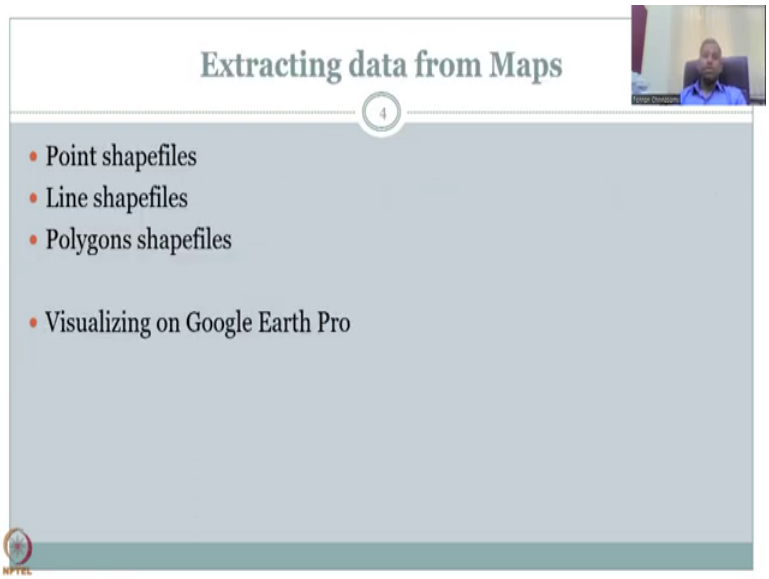

So we had used this slide earlier to look at point shapefiles, line shapefiles and polygon shapefiles and how we extracted them from Google Earth Pro. However, I just use many tools on the top and I thought it is necessary to introduce again Google Earth Pro because you may be using it more in the future.

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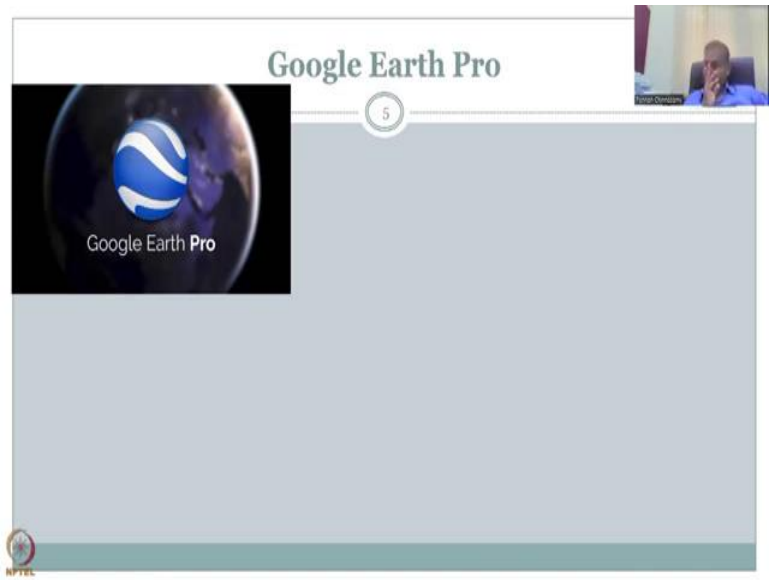

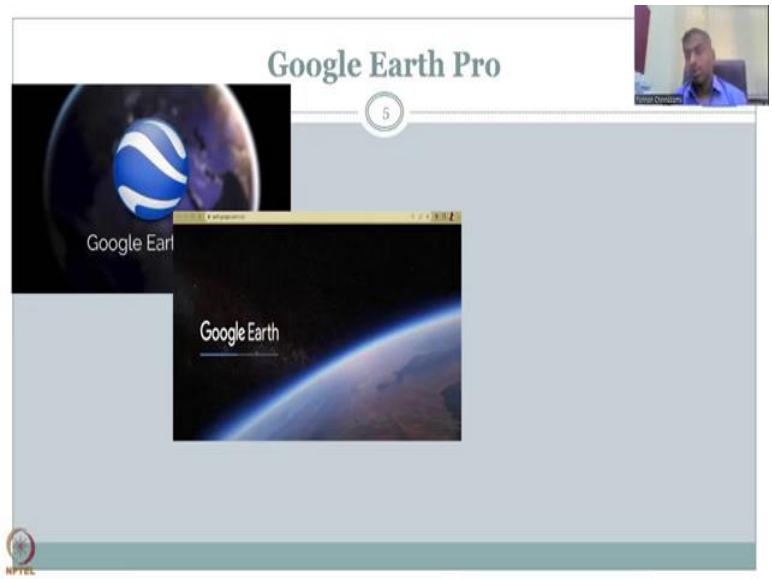

So let us look at what is Google Earth Pro. As the name suggests it is from Google Inclusive Corporation. It is a product, open source product at Google and it can be visualized as a database of satellite imagery and a platform or a dashboard where you can have these imageries and then play with them or small analysis you can do. Most importantly you get better idea and it is a beautiful visualization tool with less analysis possible.

And that is what you have QGIS for, but a lot of good maps. Importantly lot of updated maps. So let us go ahead and look at the versions. So the Google Earth Pro, initially it was called Google Earth and you would have to wait for a long time to get a membership and then the Google Earth Pro was not free for all, everyone had to pay a subscription fee, but now Google Earth Pro is made free.

A lot of scientific community uses it widely, and quickly you could get data or the best data that is suitable for your location. There are two versions one is the Google online version Google Earth Pro online and then the dashboard. The Google Earth Pro online does require a lot of bandwidth and it takes time to load. So I would recommend you to download Google Earth Pro from trustable websites, we will go through that and then install it.

If you install it then saving the data, all these things could be easier. Again all you need is a Google account and I assume most of you have a Gmail account. Google means Gmail, G Drive, any of the Google products, if you have one login you can access them all. The beauty here is the data also can be stored in your Google Drive, which is a good volume of memory that they give you for free, cloud memory.

And you do not have to carry it everywhere you have, go, so if you are going for a conference, you can just go and log into your Google account and then download the data, because it is already saved in your Google account. It is like an email where you have all your data collected. So this is the desktop version as I said is very powerful. You can save a lot, you can do some analysis which you cannot do online. And so let us dig into this aspect of Google Earth Pro, which is looking at the desktop version, not the online version. So allow me to share my screen.

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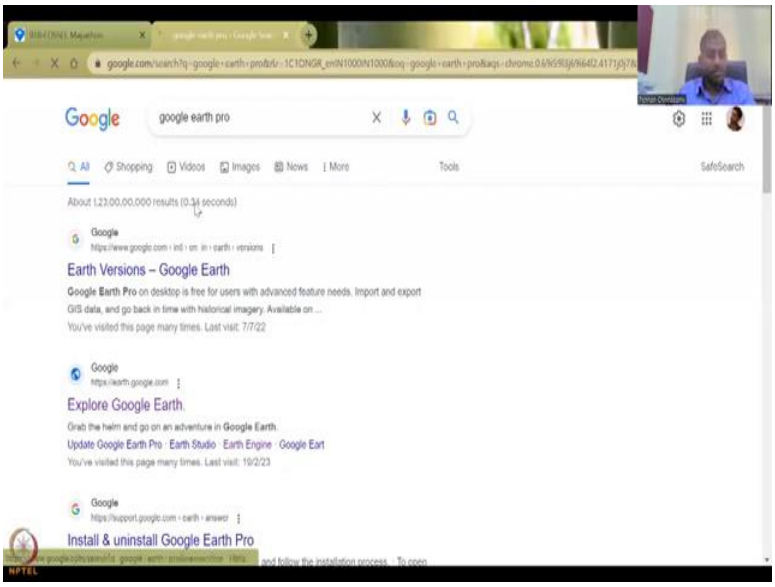

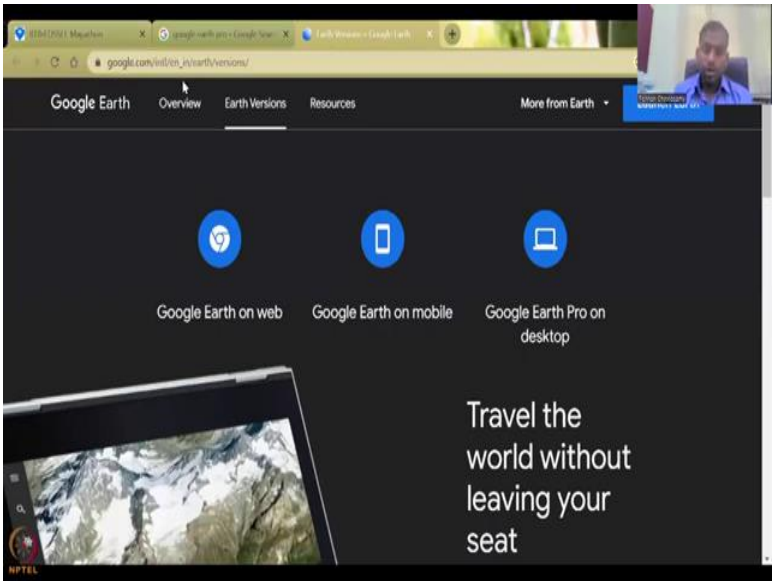
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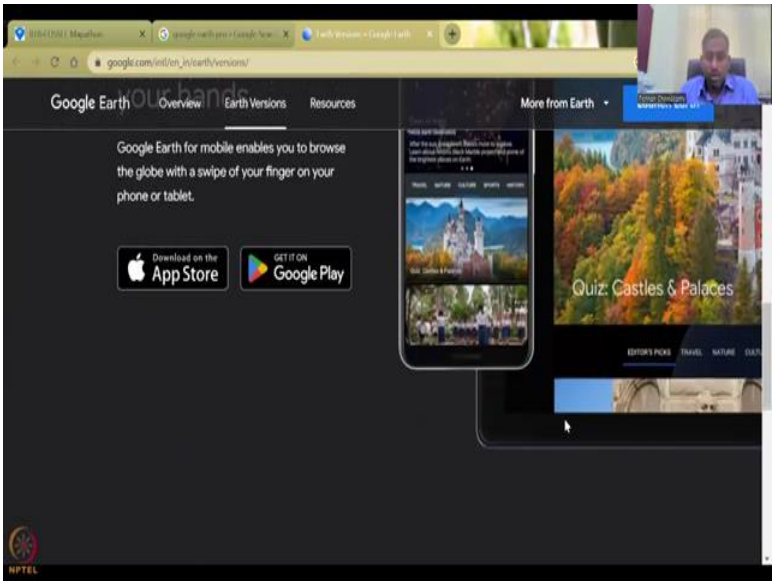
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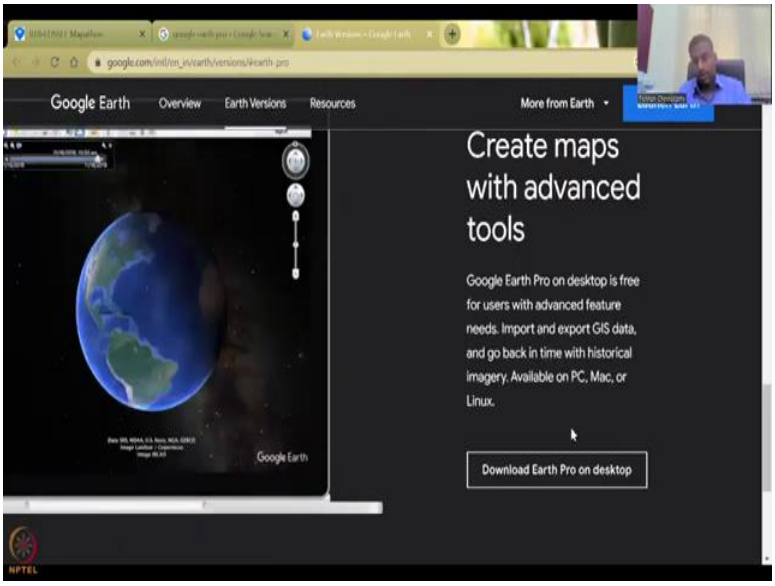
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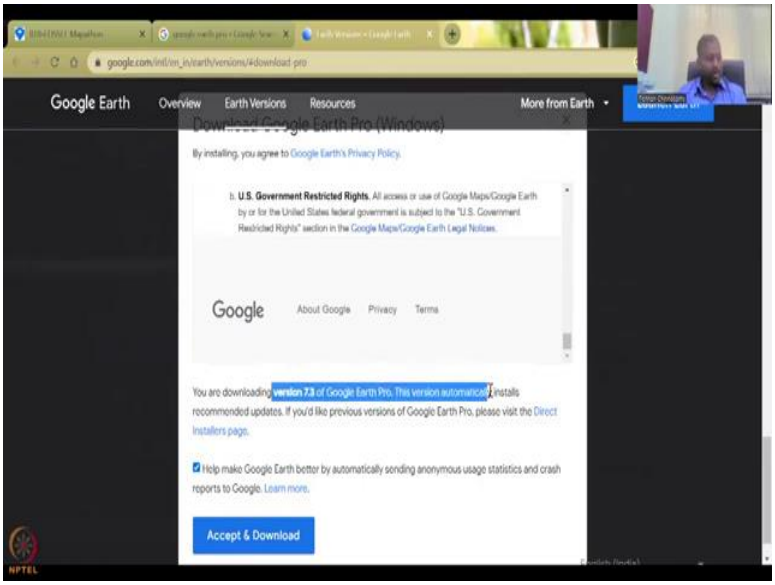

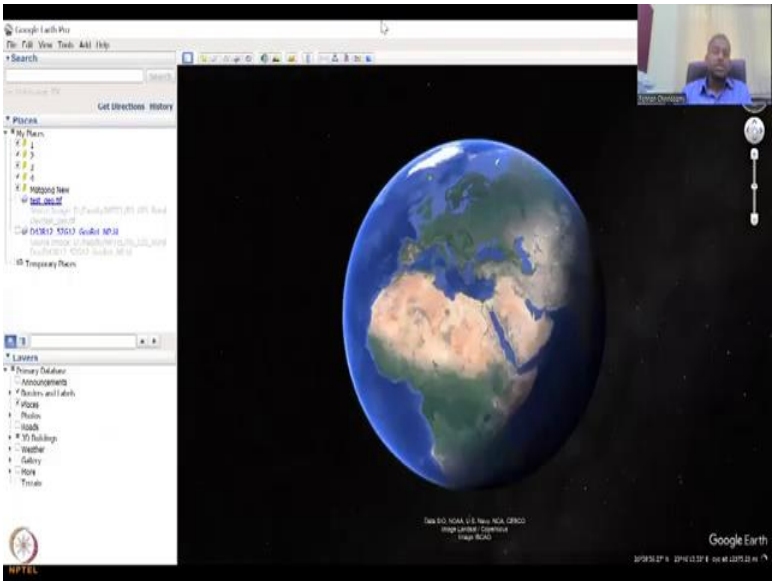

So Mapathon is going on, so which is actually a very helpful event for rural development using GIS and remote sensing. But let us go to Google Earth Pro. There are many search results like Mapathons, so you could actually get into competing and also providing data for rural development. So when you look at the versions look at the website of the top.

It is google.com, so do not go to any software download websites because there are a lot of bugs that can come in. Always download softwares from the original makers. Here the makers are, the developers are Google Inclusive, so I have gone to Google Corporations website, google.com, international English Earth and versions. So as I said there is two versions for the computer, one is mobile and desktop.

I am sorry, the Earth web, Google Earth on web and the desktop. The Google Earth on mobile is also there, but as I said the web and the mobile are two memory intensive. They consume a lot of memory and internet and they are not pro versions, whereas you have a Google Earth Pro for the downloadable version. You have a download, there is a big data associated with it, but once you download it, it goes well.

So you could see how you could use it both for the Google Earth Pro and the Google web. You can download it on Google Android store or the Mac store for the mobile apps, but then you can also download the desktop version. So you can say download Earth view, Earth Pro and for Windows, they ask, we have to go and accept some conditions and then download. The version is 7.3, which is the latest, I might have an older version, which is okay.

Because I do not get, I save a lot of data on my Google Earth Pro, so I would like to keep it and only change the versions, when there is substantial improvement. Every year maybe they improve it, but a substantial improvement comes not every year. So what we will do is, we will download it, accept and download and then you can see where it downloads, then you run. It is like a normal software, you run it.

So I have already set it up, so if you run it and pin it to your start menu, you will have it here, which I am opening now. So allow me to share that screen where Google Earth Pro is turning on. So once it turns on, it is beautiful that it turns around and then centres where you are. So, for example, you are accessing this from the US, the US part will be centre in the image.

So it is a beautiful software, where the whole planet can be seen. The first tool I would get into is the tools that you use for rotating the globe. You can see it is a sphere, but again as I said Earth is not a sphere, but the best model is the sphere. So you have the hand and the mouse if you go in and out, you can zoom in and out.

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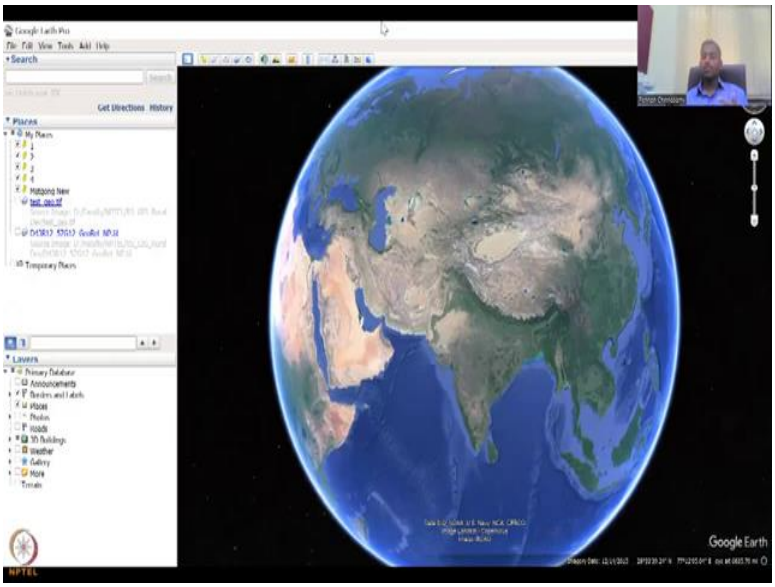

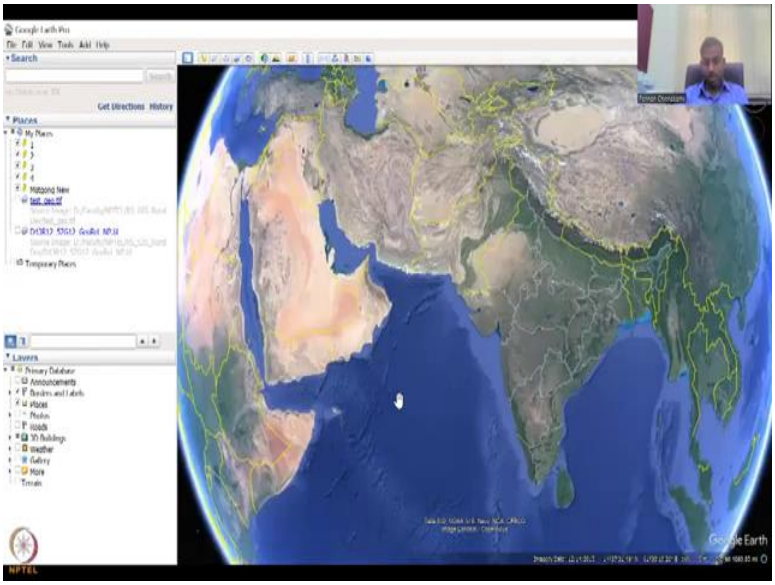

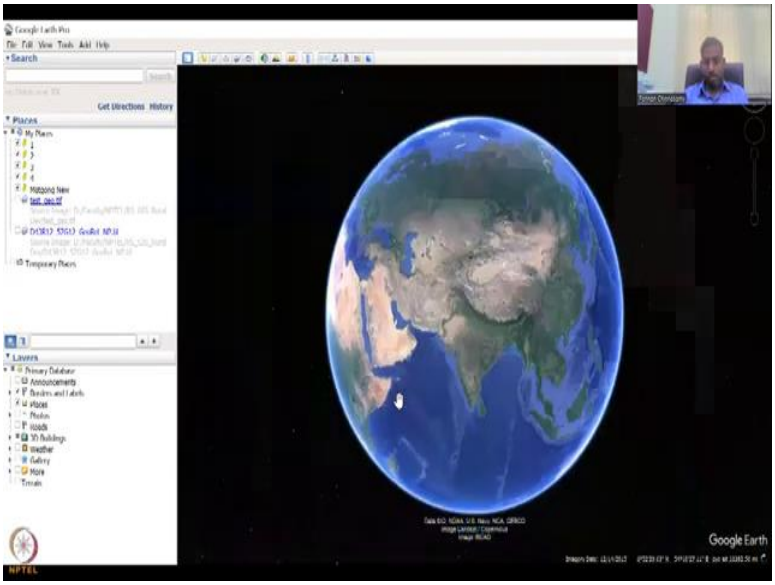
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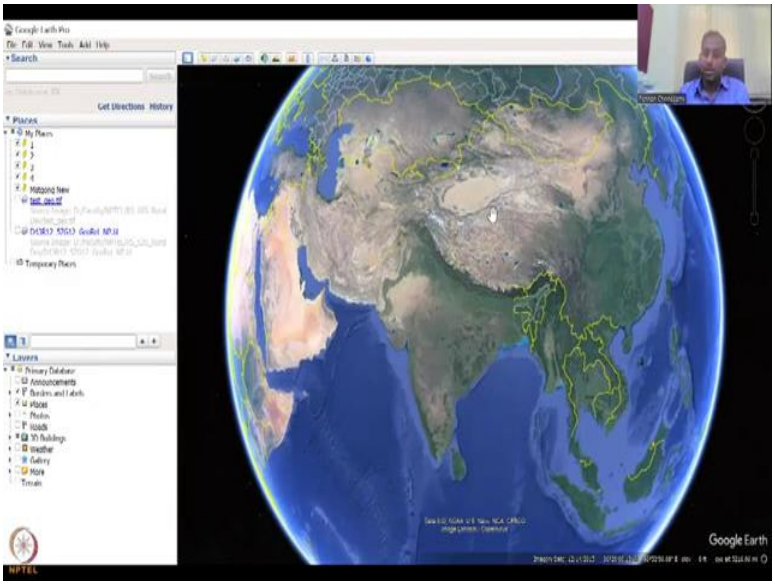
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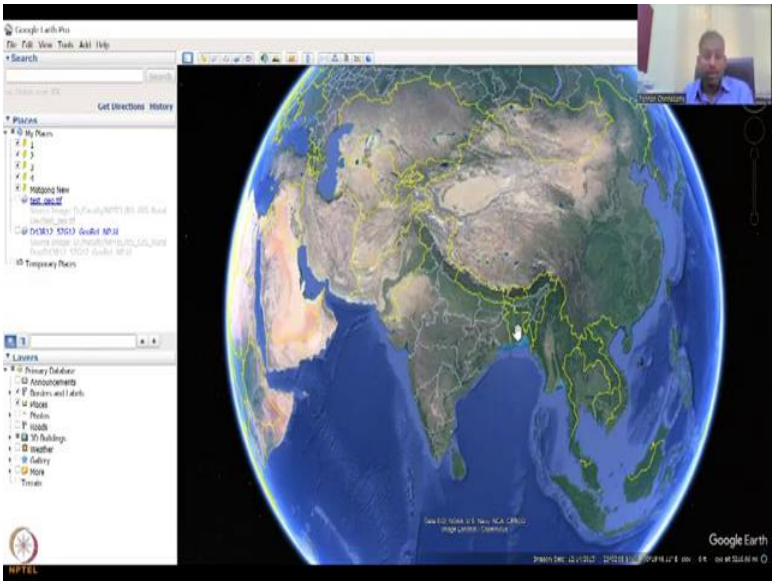
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So I am just moving in, I am zooming in and zooming out, and then if you want, you can hold the left click, if you left click the hand goes like this, you could see and then which is mean it is holding on to the image and then if you go left or right it turns. Actually you could get a lot of info and also playfully waste a lot of time, if you are very interested in this. You can just sit and watch a lot of these data and then get ideas.

But I have had students who spend a lot of time, but forget to do the homework, so do not get too much engrossed. It is a beautiful tool as I said, but make sure you have an agenda and download the data. So moving on, the first one is the hand tool as I said and the zoom in zoom out, which is very, very important to understand and then you have your North, if you go, if you take a mouse on top of the arrow bar, you could see that north, west, east and south are there. You can also click on this and then it rotates.

And then up, down, north, south you can go. And then this is mostly for move, control, drag to move around, so for example, you can hold this and then spin the globe, if you want, which is going to bring it back. It does not come back again to India, you will have to bring it back. And then the zoom in, zoom out, if you do not have a mouse, you can still use this zoom in and zoom out tool. You might be fascinated to see that once you zoom out too much you can see stars and other things, but I will take you to another planet through this Google Earth Pro.

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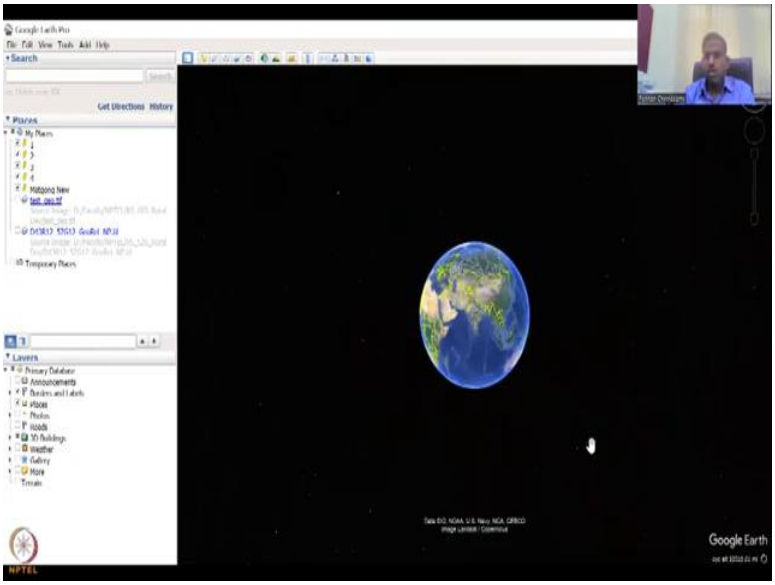

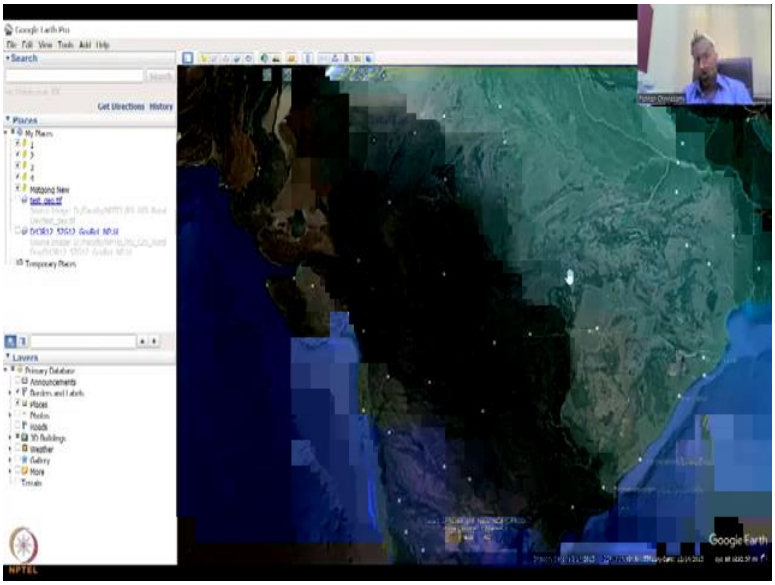
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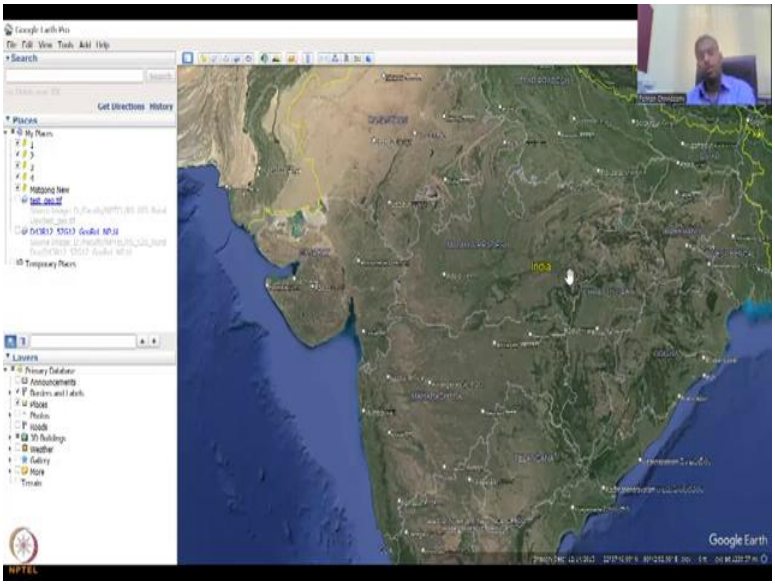
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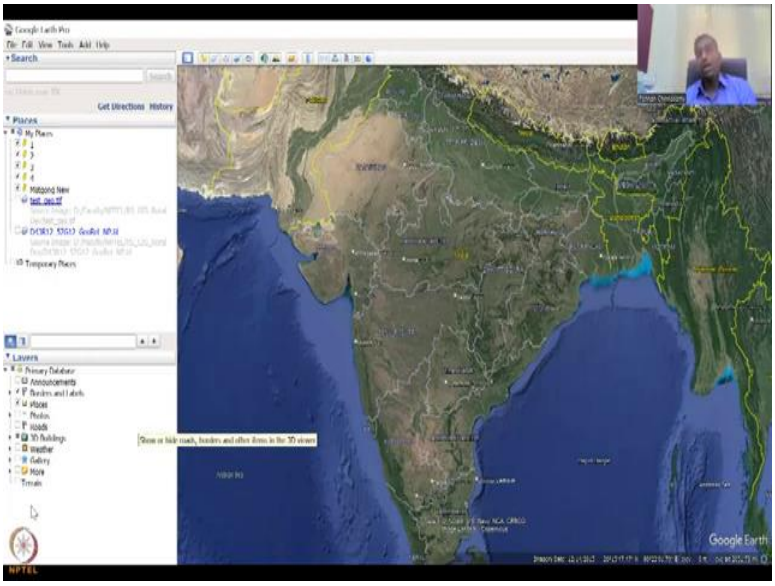
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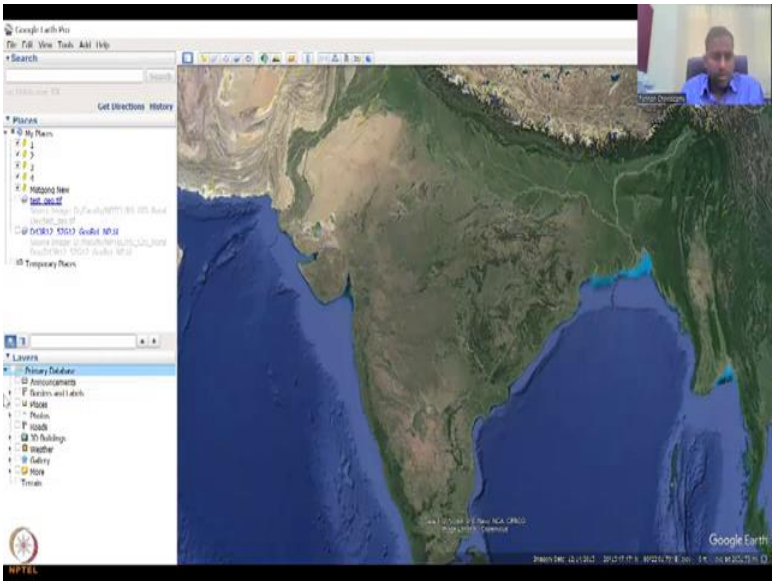
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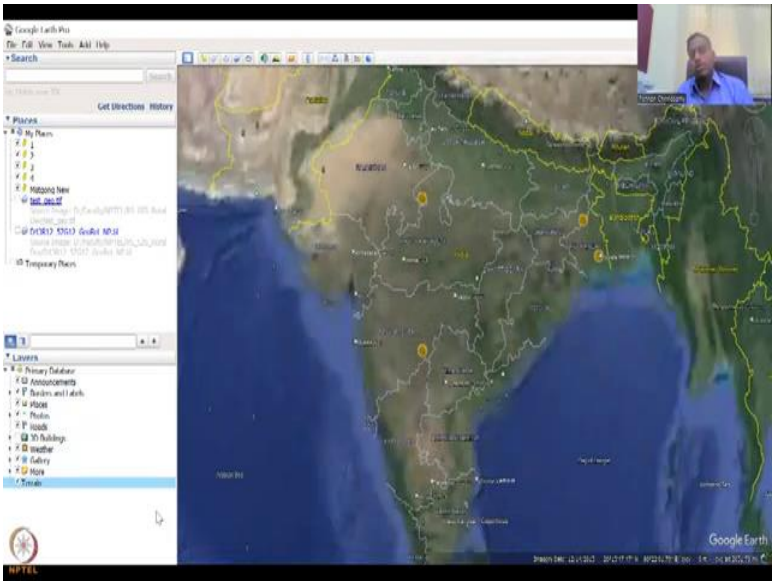
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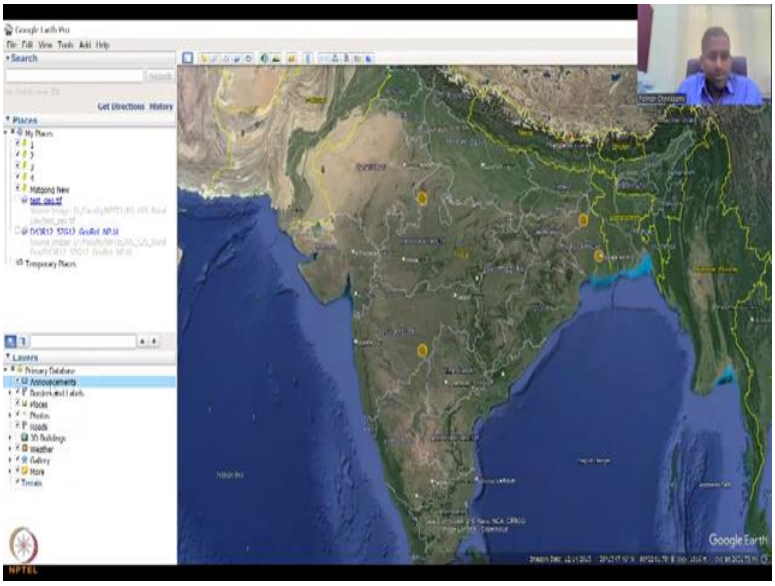
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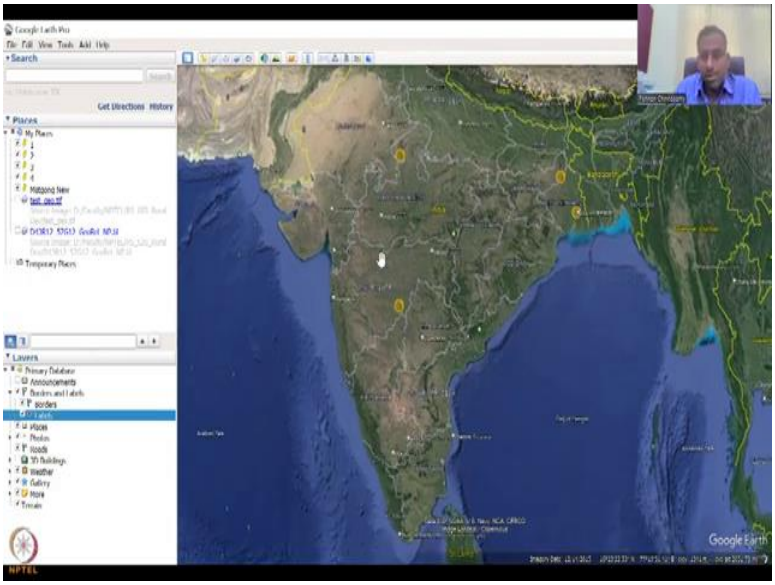
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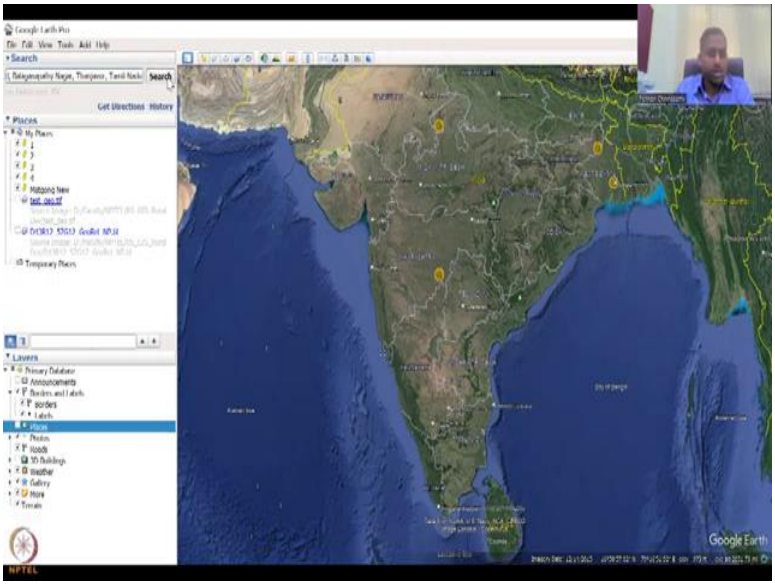
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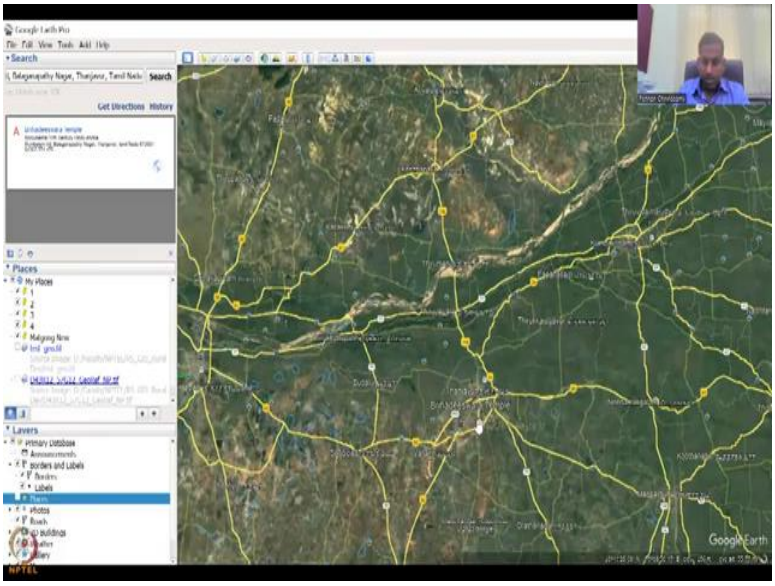
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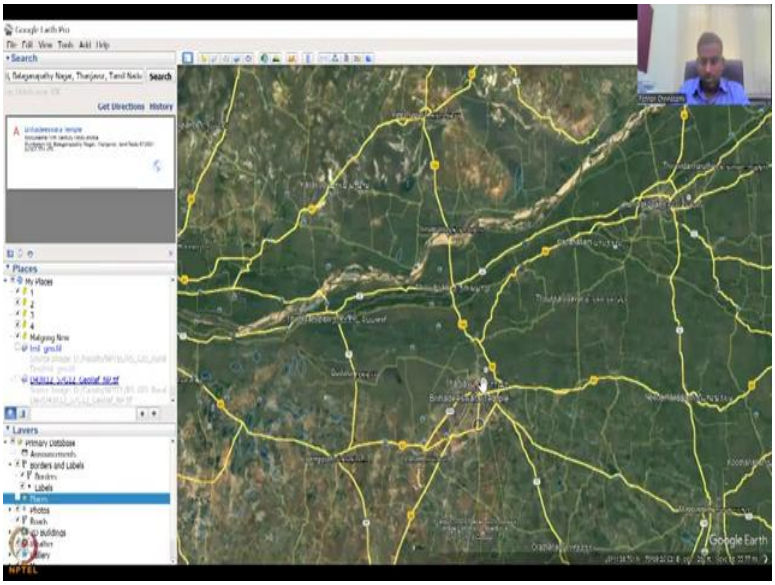
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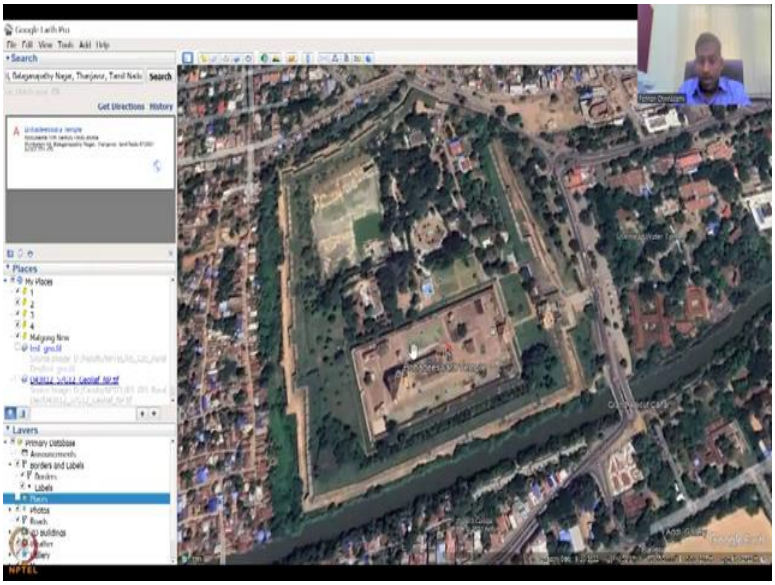
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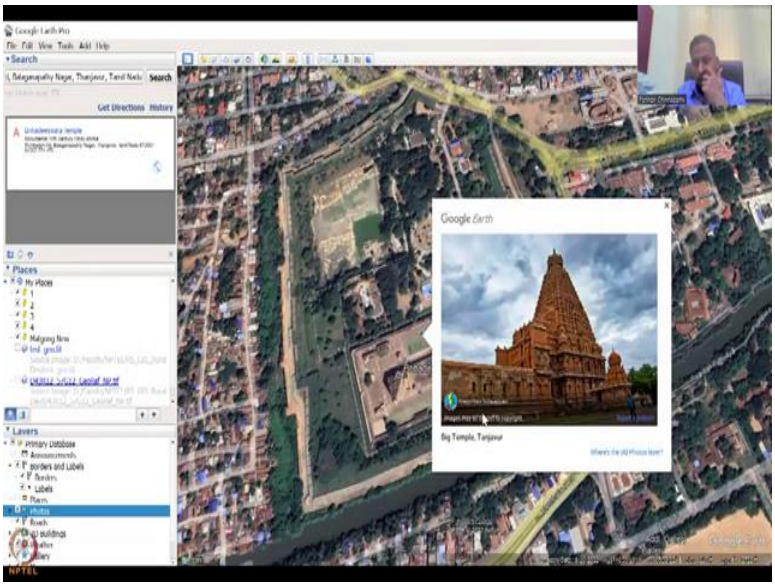
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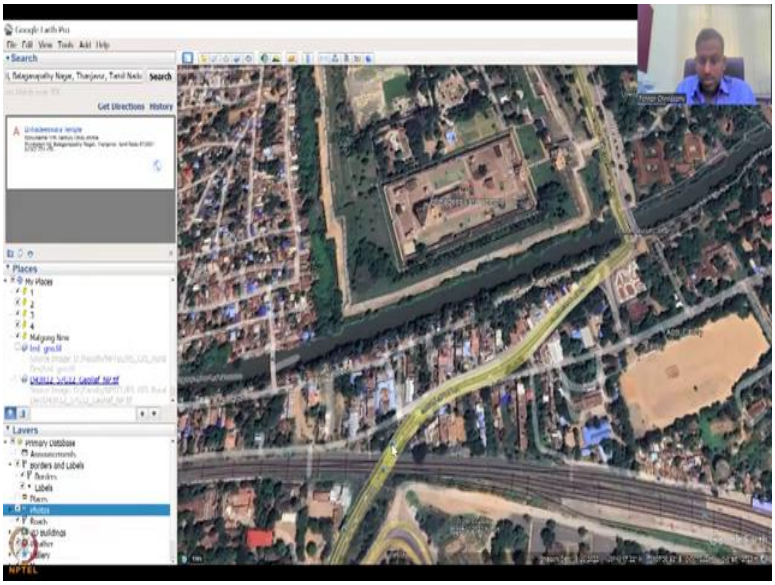

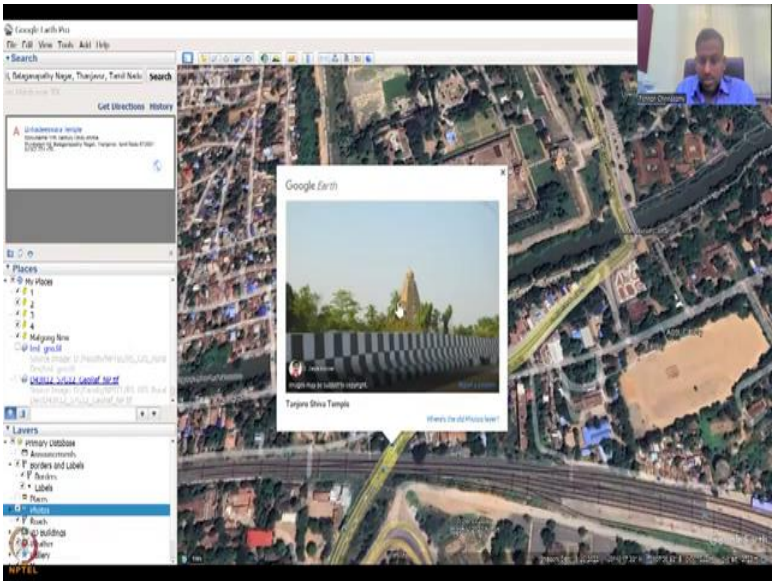
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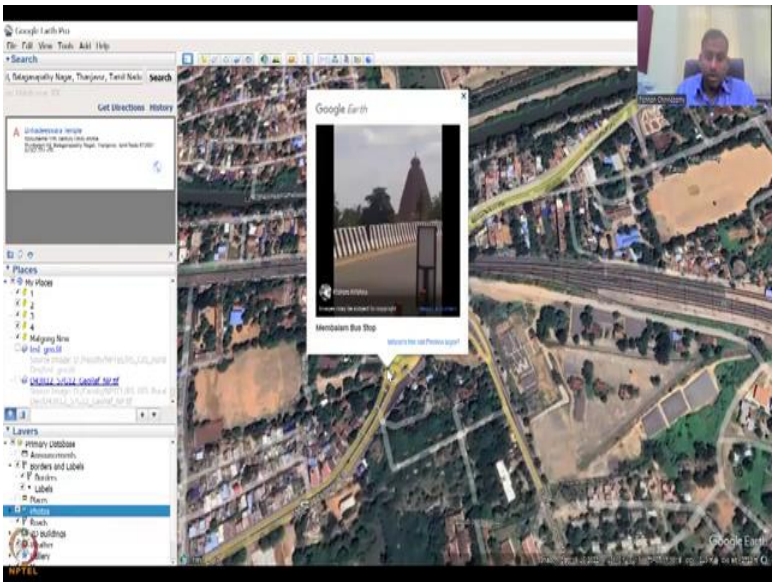
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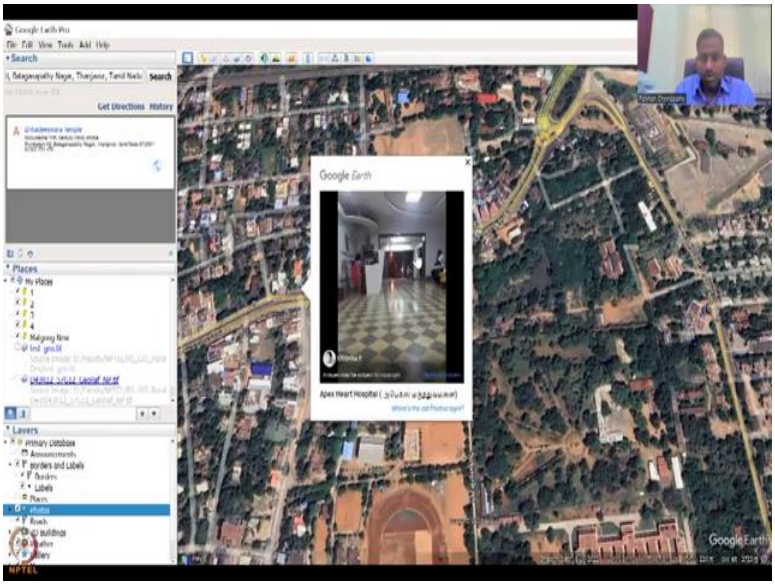
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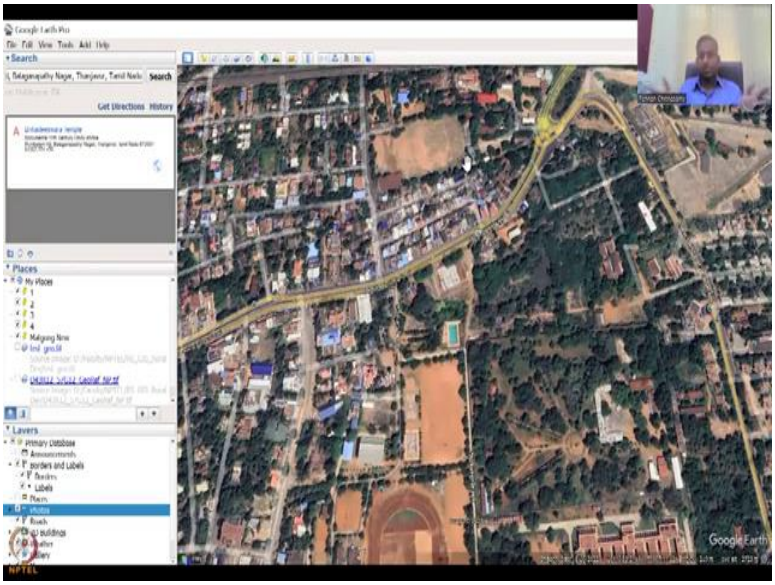
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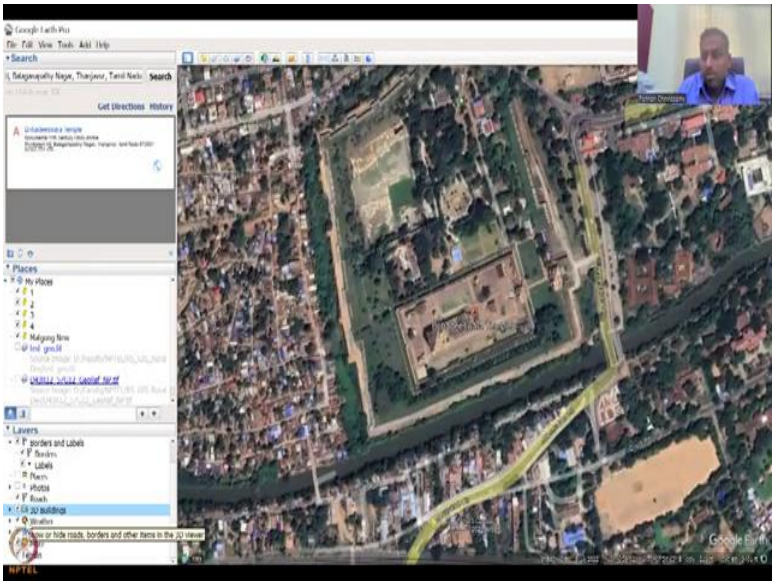
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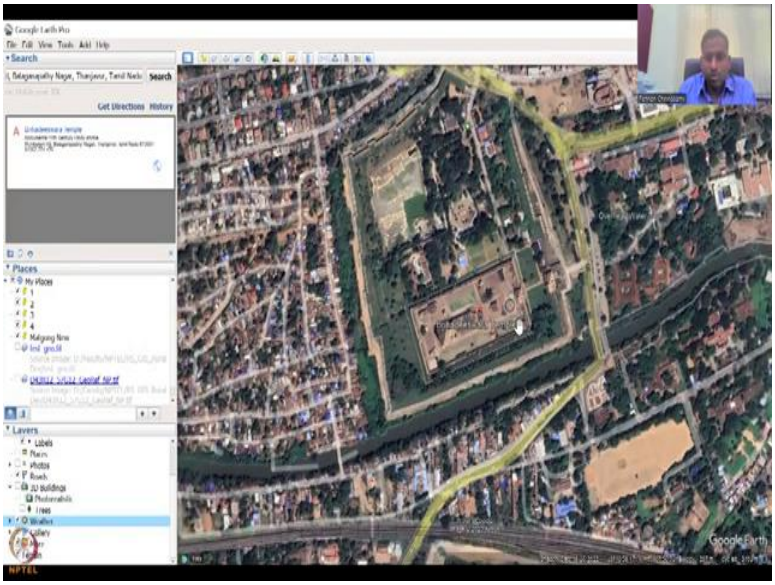
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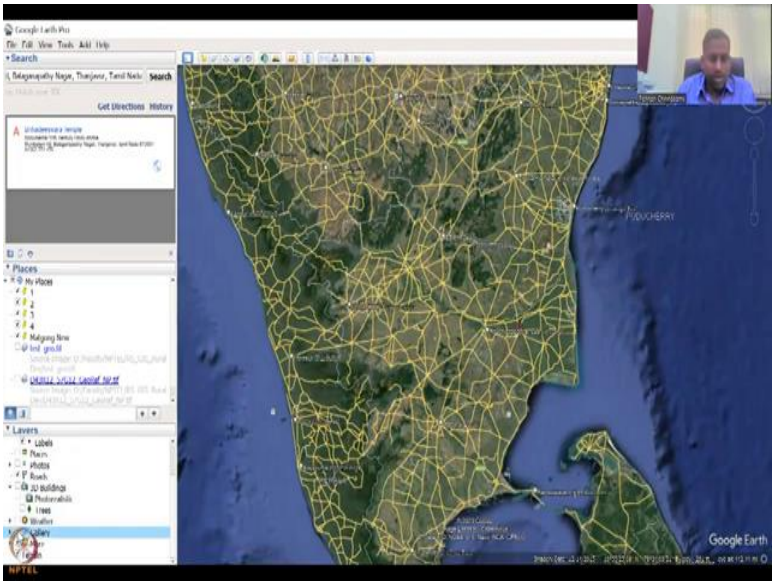
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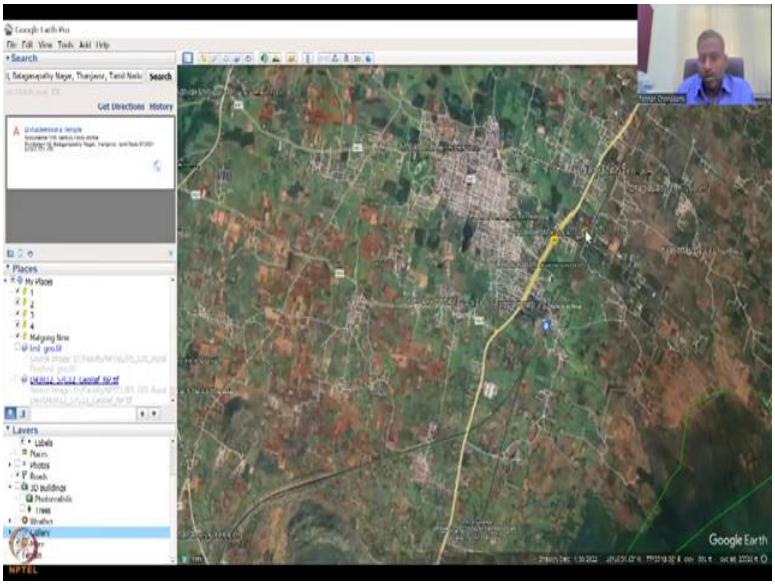
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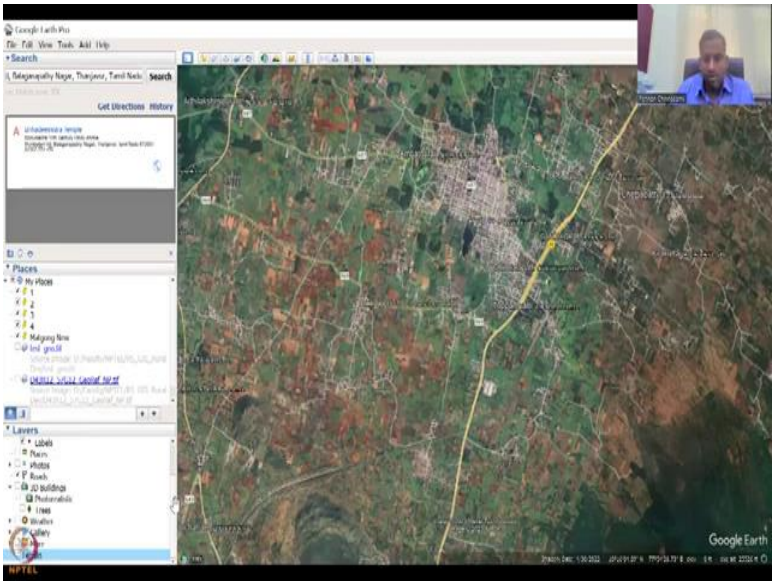
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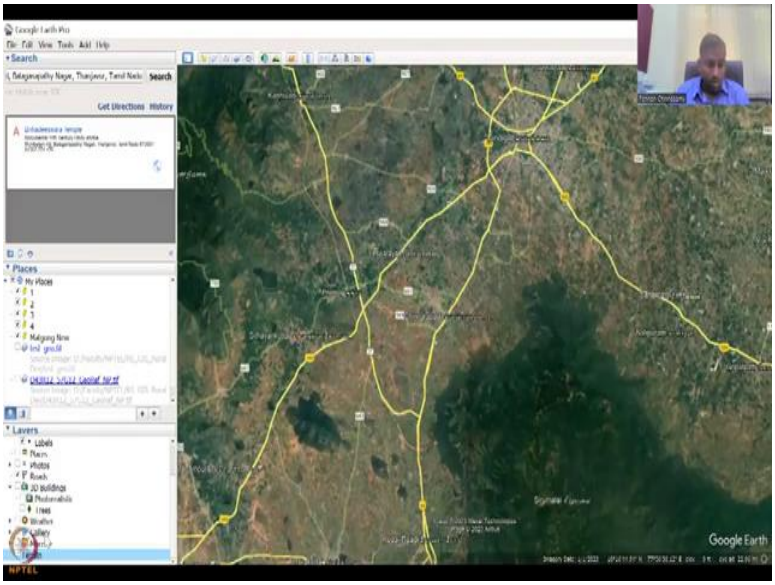
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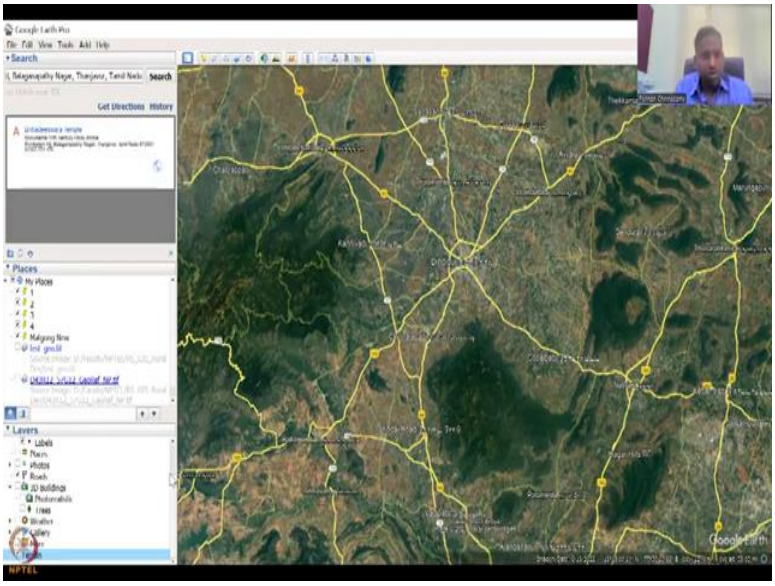

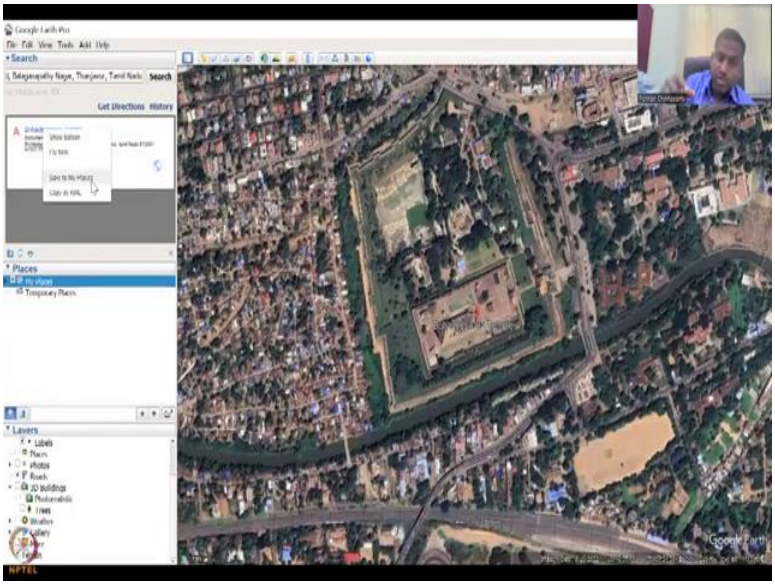
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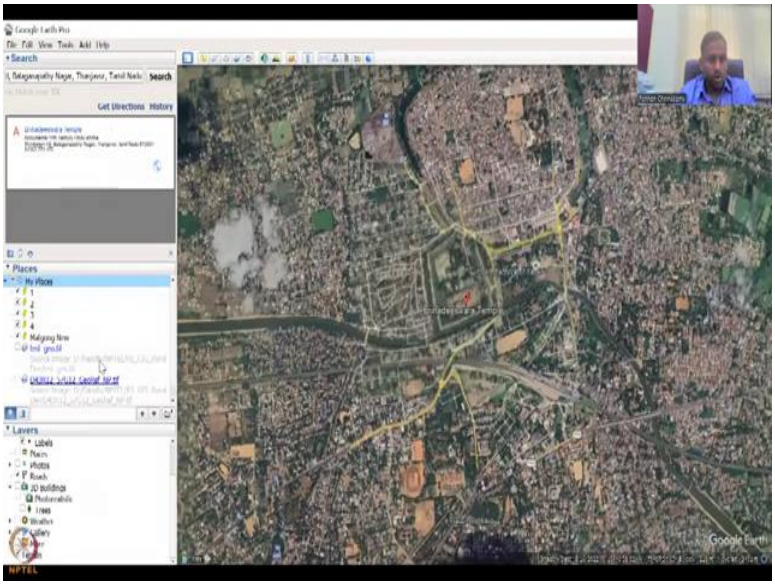
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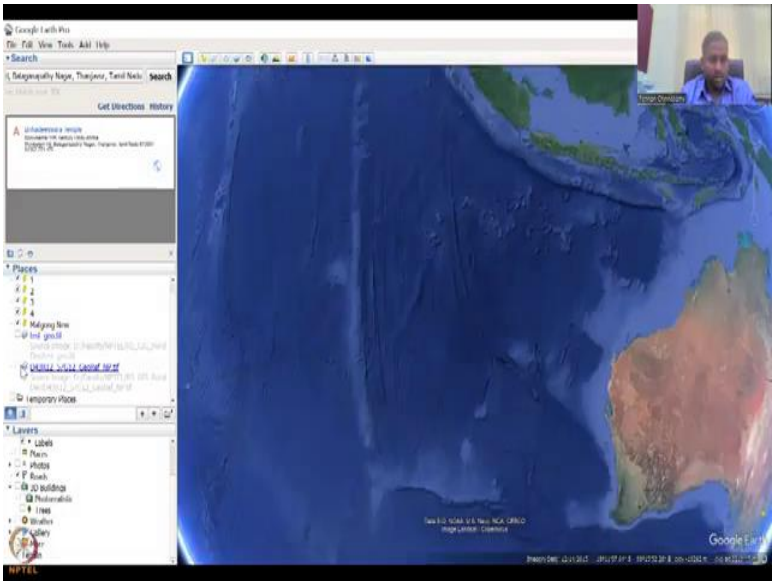
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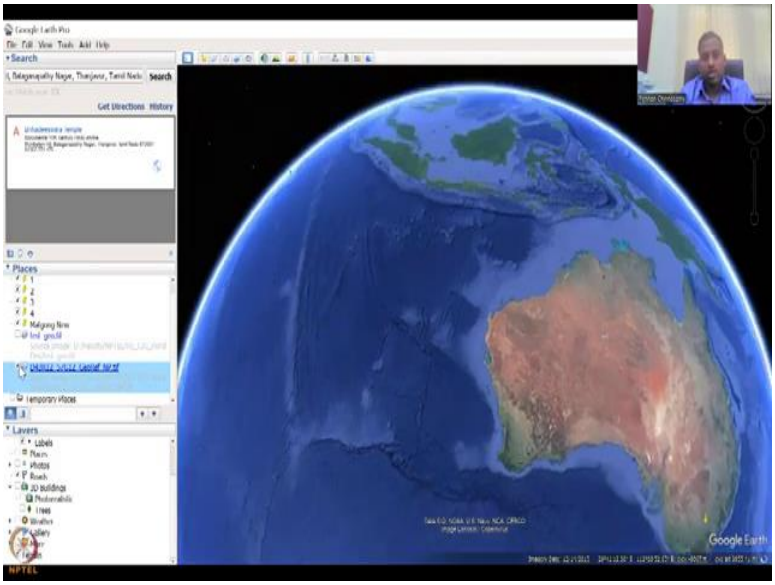
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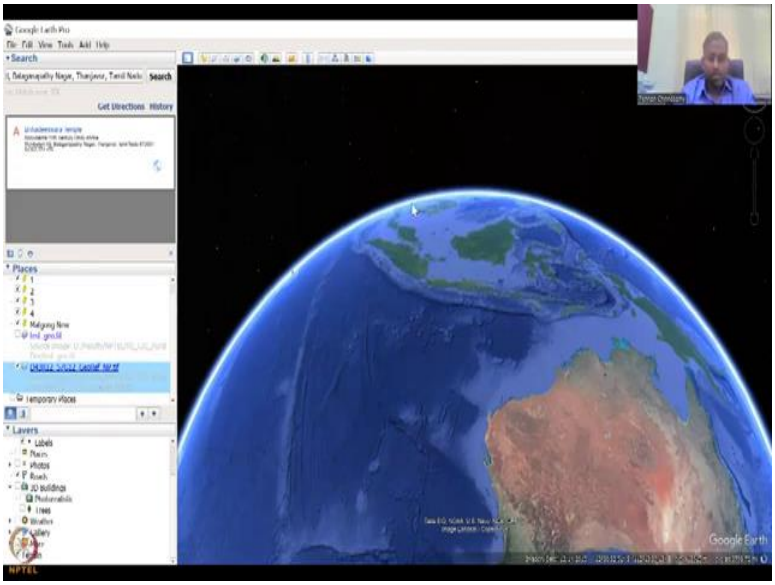
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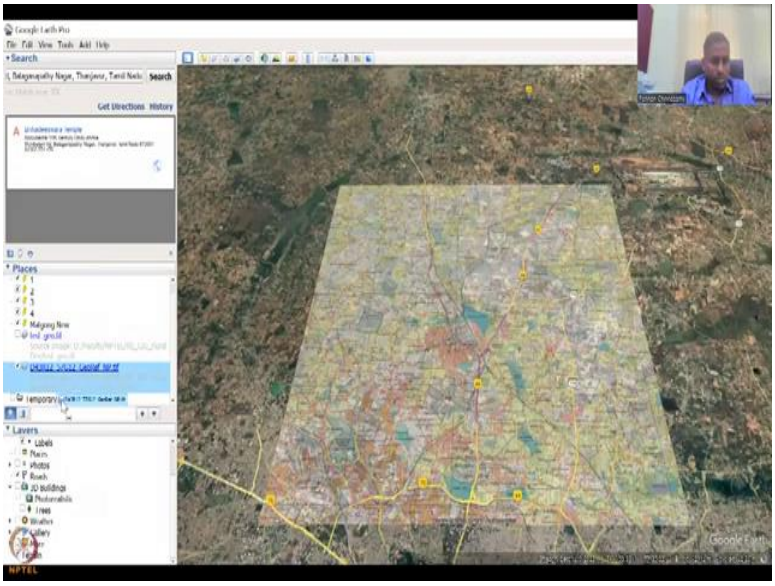
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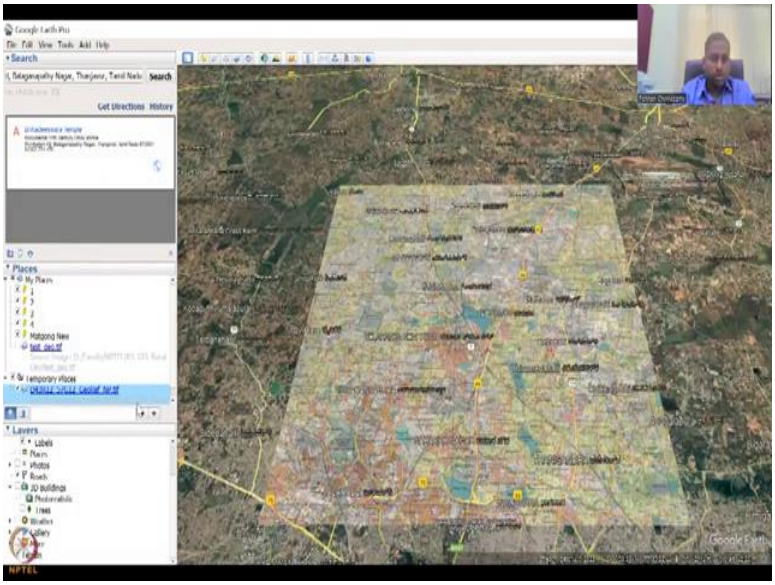

So now you could see that the boundaries are not exact boundaries, but then it redraws itself. Do not take these as the official boundaries, official boundaries are always the ones given by the Government of India and I have already shared the survey India Government Report and Websites, Survey of India data set where we downloaded that has the accurate information. So first, before we start some bookkeeping.

I have talked about this north arrow and other things and the hand tool, but most important is this left side. The layers are too many, do not keep them on all. If you keep them on, then a lot of Internet is going to be used, pulled and it gets slow. So just keep the very important ones. So the primary database, normally when you are first time user all will be clicked, so just unclicking and clicking all to just show that how much it takes…

So how much memory, you see how my system also, even though I am in IIT, very powerful Internet, it does take some time. So the spellings also I will be careful about because again it may not be the official one, so please use the official ones from the Survey of India. So announcements is emails and stuff, which you do not want messages from someone, mostly for business. So you can take that out.

It does not help much. Then you have borders and labels, which is very important, because it gives you the borders of the states and districts when you zoom in. For example, if I take the labels out, the Maharashtra, the names go on, so do not do that if you need, if you know much you can have it. So it is better to have these two and you could see that the beautiful part is Chennai is in Tamil and Hyderabad is in Telugu.

So if you see that some languages are also brought in, so it is beautiful that Google acknowledge these differences. I think only India would have all the states with different languages compared to other countries. So that is the beauty of India and Google is acknowledging it by having different languages near the name as much as possible. Then you come down to places.

See places is very important places and hot spots, example, tourist spots, again you do not need it because it consumes a lot of data. So you can remove it. It is not that important, photos is photos added by people, for example, you are going to the Thanjavur, Brihadeesvara temple. It is the biggest Shiva temple and it has a lot of history to it, but you have not seen it. So some people would attach an image and then put it in that temple area.

Let me show you as an example. This search box to the left helps you a lot, so Thanjavur, Tamil Nadu temple. And this is a Brihadeesvara temple, so let us click it, search for it. Once you search it, it automatically zooms in. So and then a lot of images pop up. You see how many images are popping up. So all these images take a lot of your memory. So let it zoom in. So these are, there is a satellite image, fine, but there is also people added image.

For example, if I click it there is someone called Alagu Ravi Solaiappan who has put an image. It is a beautiful image, but again for you it takes a lot of data. So it is better to turn it off. See, for example, if I turn it off you still have the temple, which is the boundaries and other things are captured beautifully, but all the photos are gone. Again it is not only the temple photo that comes up, it is all the other photos also that actually pulls up.

For example, coffee spot, a bus stop, here on the highway someone has taken an image, from the highway how the temple looks, again these are good, but again why you need it, because you do not need it for your particular thing. So a lot of people have taken image very far away from the temple. I am going to click another image just to see what we have. So this is a hospital and then you can see the hospital looks like this and some other images.

These are important, if you go to an area you do not know how the building looks, because this gives you a 2D version from the top down. You do not know how the building looks and some people would have had it. So turn on and off as they needed. So now, I have turned it off and then you have roads, which are very important especially for our purpose of connecting, connectivity rural development.

And then we have 3D buildings, it takes a lot of memory, as I said not all buildings are made in 3D by Google yet, so we will just remove it. So trees, 3D all I have removed. The weather is weather updates on certain locations. You would have seen the weather update when we zoomed out like a Sun, again we can have other websites for it, so we do not need it. So I am taking that out. Gallery is not needed.

Gallery is just some attributes that can come up, for example, you have here and here, some attributes maybe needed for a particular thing, so Gandhi Gram to Kanyakumari, so all these galleries can go, the more can go the terrain is an elevation thing. So if you want terrain you can keep it. It gives you the elevation in feet, so you can see here the elevation changes, if I change the thing.

If I do not use the terrain model, you will not see anything, you will just zero. We will use it, but that is what the terrain is what we will do in the digital elevation model. So let us keep it for now, it does take, so basically there is a landsat image or a plain image from Copernicus and then underneath there is a elevation data. So both are being taken if you have the terrain model. Good. So this is the tools, layers toolbar and then what we have on the left side is places.

There are two things which are important here, there is my places and temporary places. So, for example, if you have this places that you search, you can pull it down to temporary places. I am going to show you, you can say I like it, double click and then it will go in and then you can say that from here right click and then save to my places. So if you save to my places this location is going to be saved.

Because every time you do not have to come and type in the search box. And then temporary is sometimes when you open a file, like last time we open the image file and other files, it goes into temporary, but you can always move back and forth. For example, these are the images that we had initially that means double click to show you that the file, yeah, so that we know that we use this when you georeferenced.

So that image is there, you can actually pull it down to your temporary files to also… so see, now it is moved to temporary files, but if you save it at the top and then when you close it, it will ask ‘Do you want to save your locations?’ This web page, because every time you open it will come, so if you say, yes, then the locations are there. The temporary is taken out. So

these are the left hand side. Most important is a search box. You can search for any village or any location that is available on the map.

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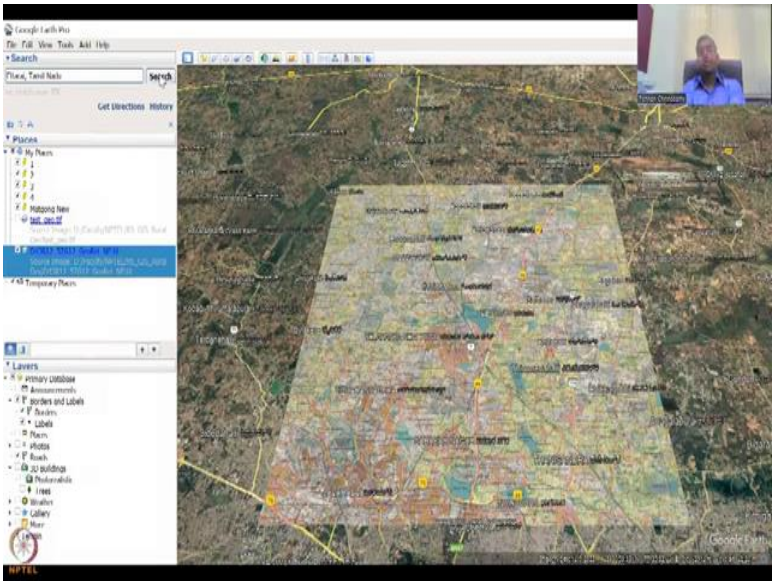

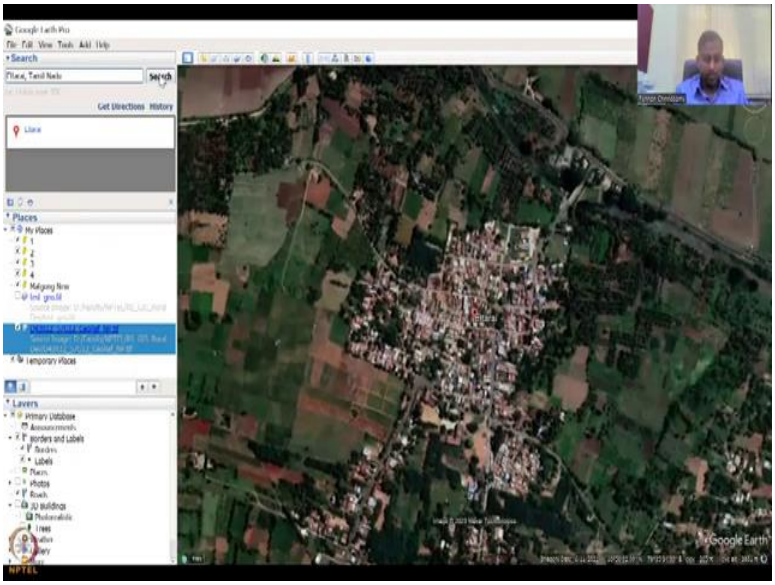

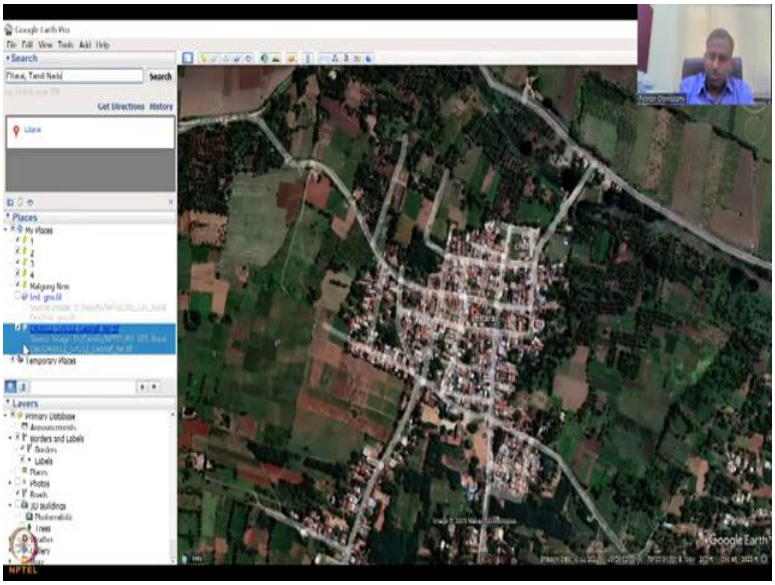
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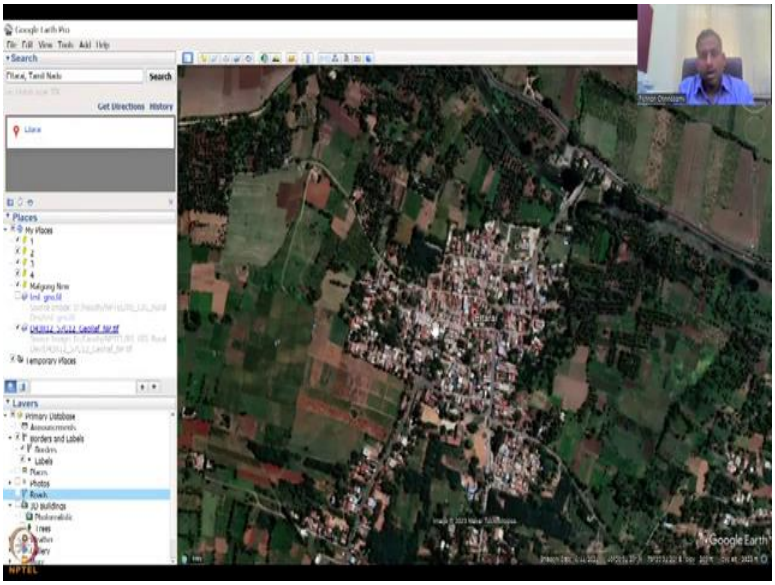
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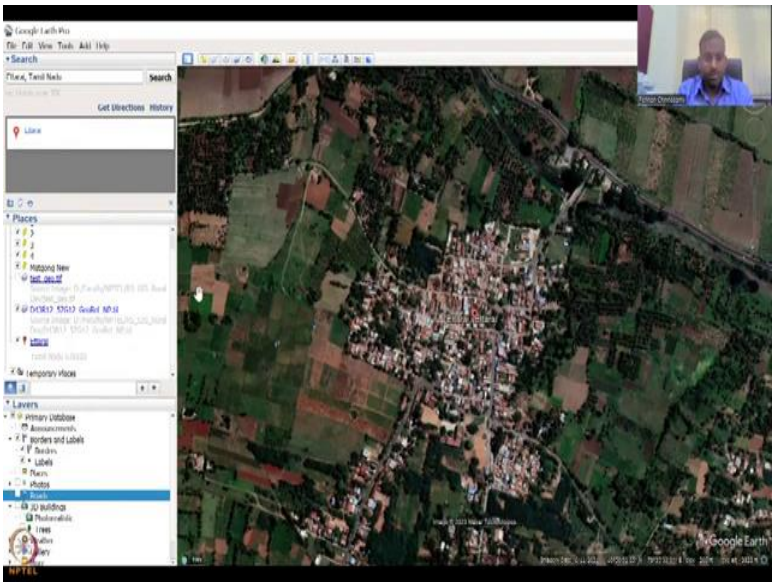
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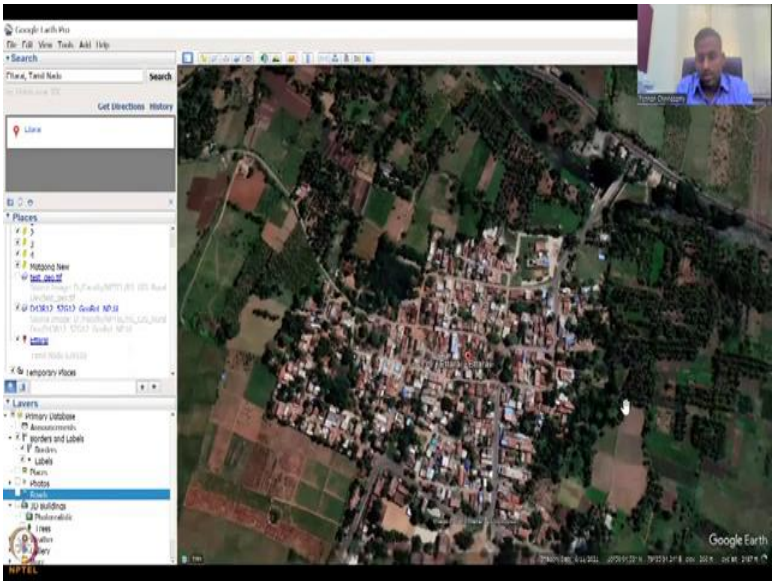
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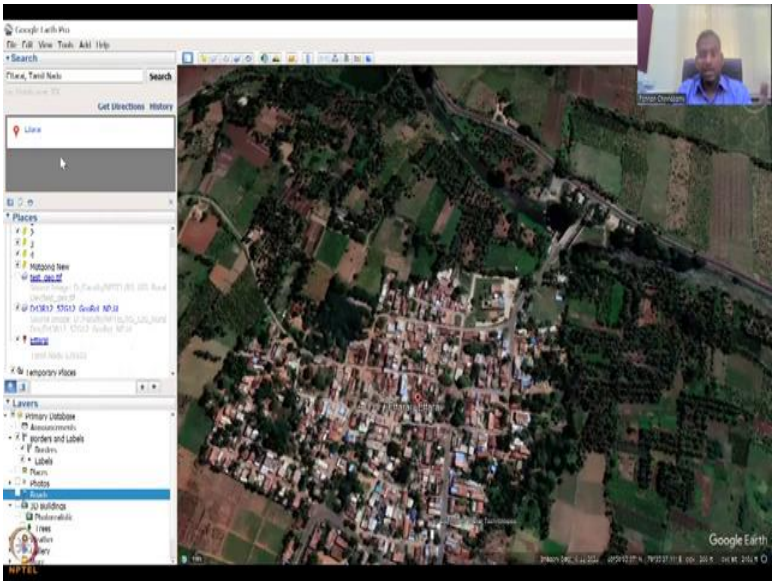
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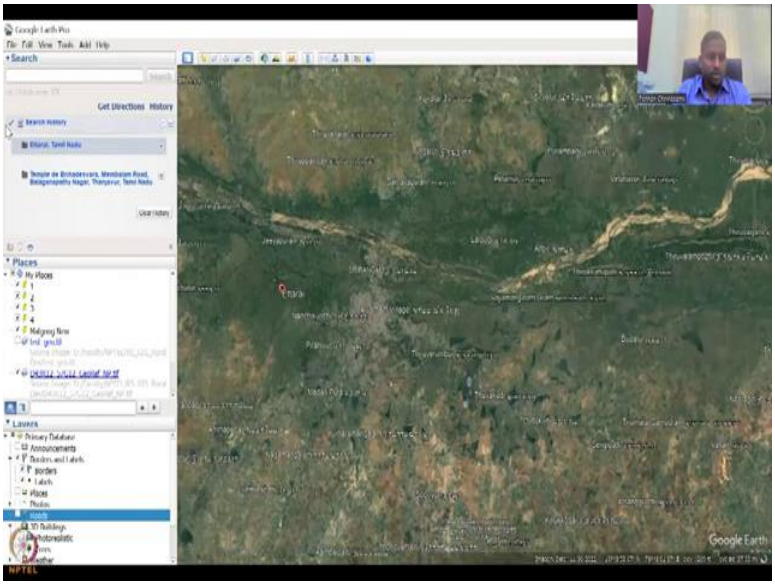
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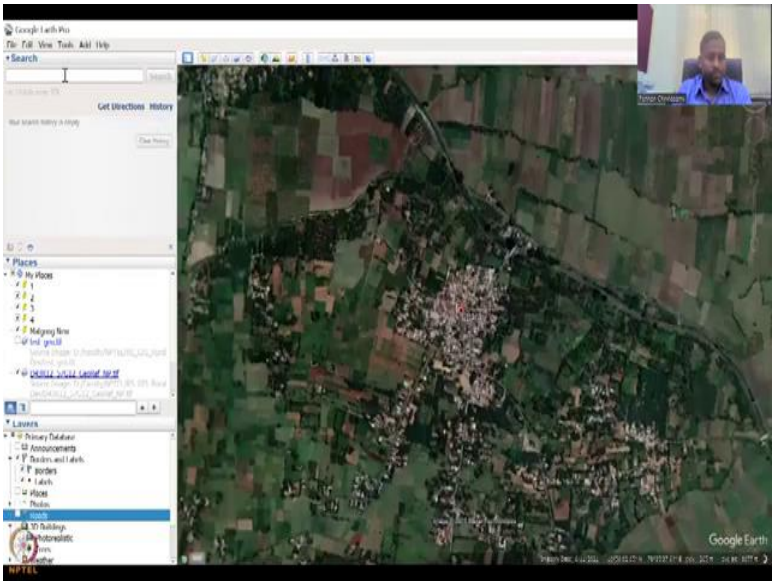
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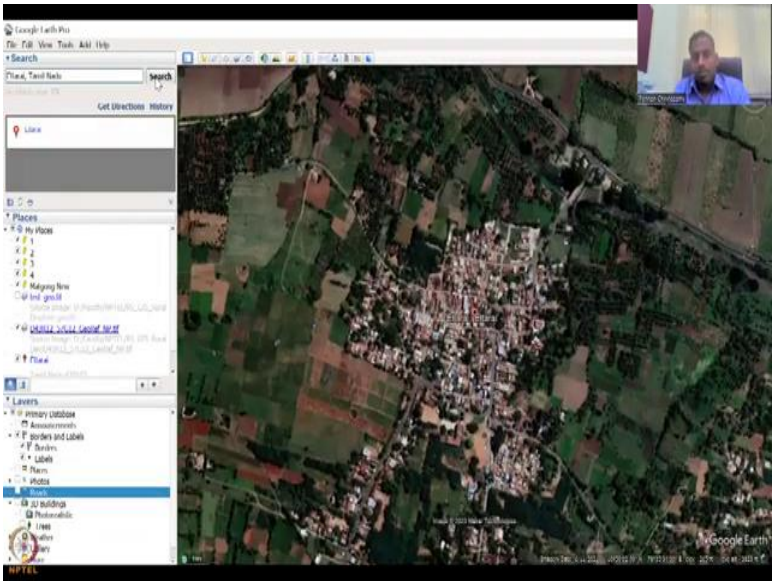
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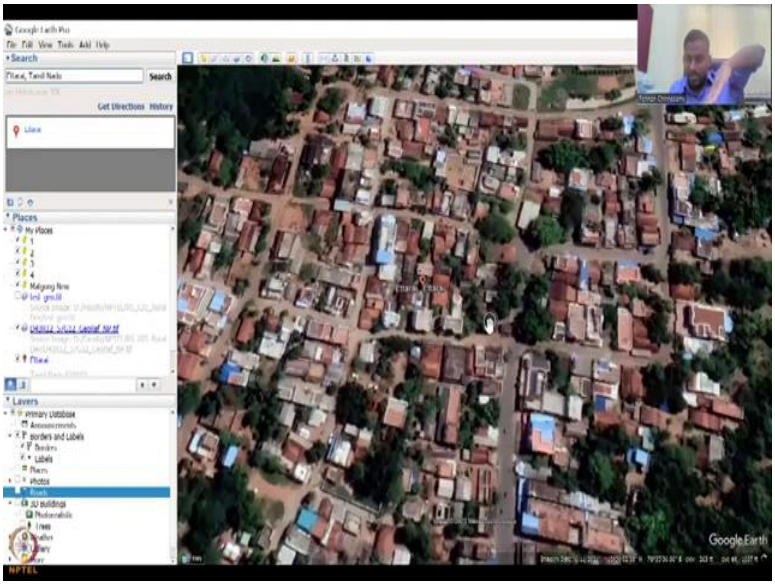
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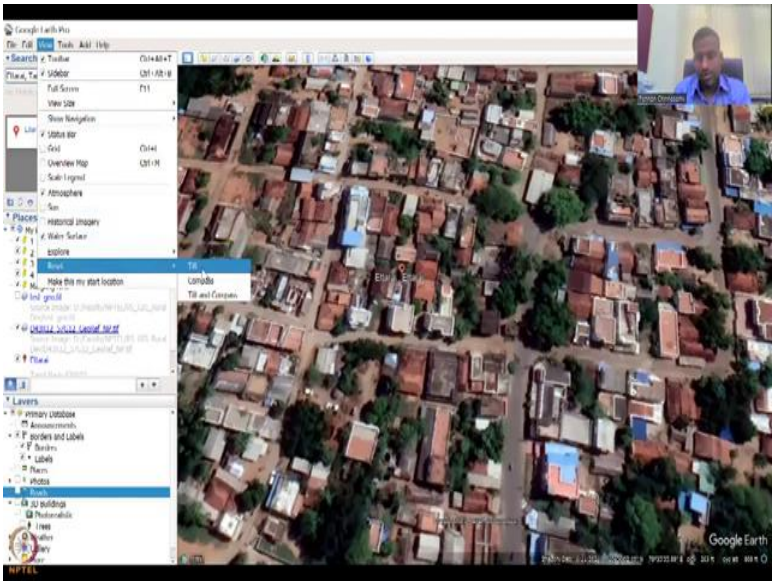
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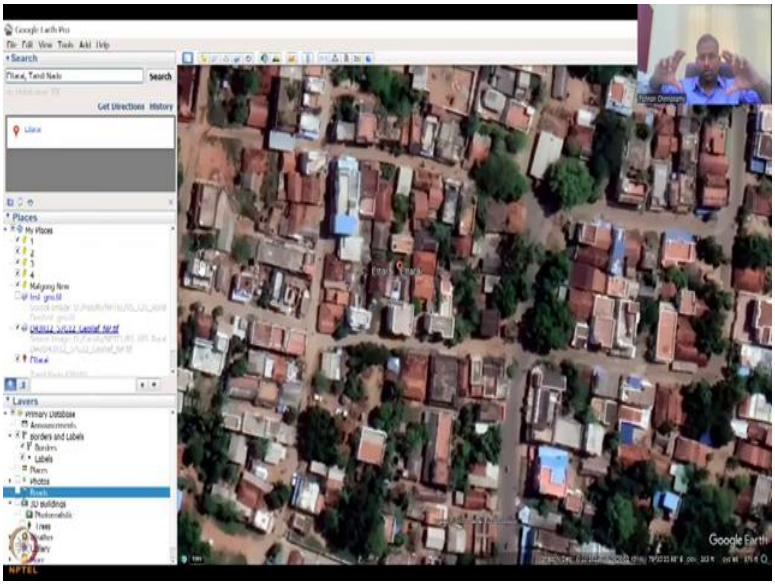
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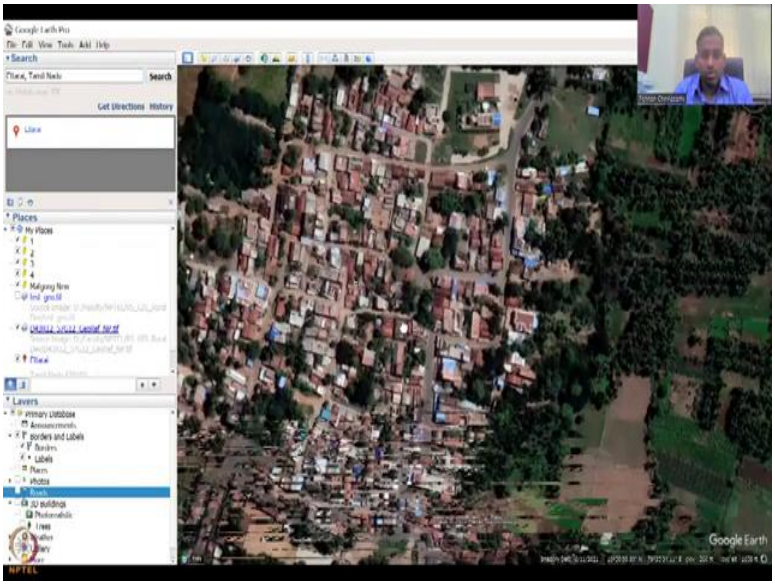
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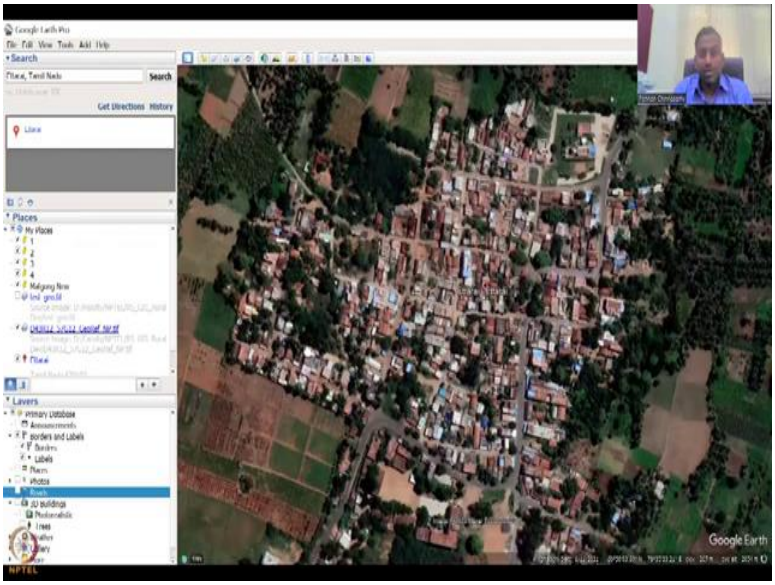

Let us say Ettarai village, it is Ettarai village in Tamil Nadu. And then you click search. So this is at least my own village we can look at and this is fascinating, because to visit the village it is, in those days it was not possible this kind of image and I do not need the roads, it is too much you know on top, so maybe I can remove it for now and then you can zoom in. You can save to my places. I am going to save to my places as Ettarai.

And you can see it comes up, the zip code comes up or the PIN code and the location comes up. You can Google what Ettarai is, it was a village, but now you can see like most of the houses are taking it up, so but again, still there is a lot of agriculture that goes around and part of the Kaveri water comes in for agriculture. So the search box is very important. Once you search the data comes into this box.

You can get directions or history, history gives you where all you searched for and then just click Ettarai and then you can clear the history if you want. I will just go to Ettarai and then take it back out. So now we have it. So in the left you can actually download these locations, copy paste them, get directions like as you do in Google map, so you could see Google Earth Pro is kind of a mixture of map plus more on the 3D version of the Google Earth.

One thing which comes in handy is when you zoom in too much, it tilts, the image becomes kind of a tilt image. If you do not want it, then go to view and then right click on the tilt, so if you say tilt, it will reset the tilt, now you can see it comes back up. So you could see all the village, the school where my father went and studied hard as I said. You have these villages. So these are some tools that are very important. I have covered the left hand side.

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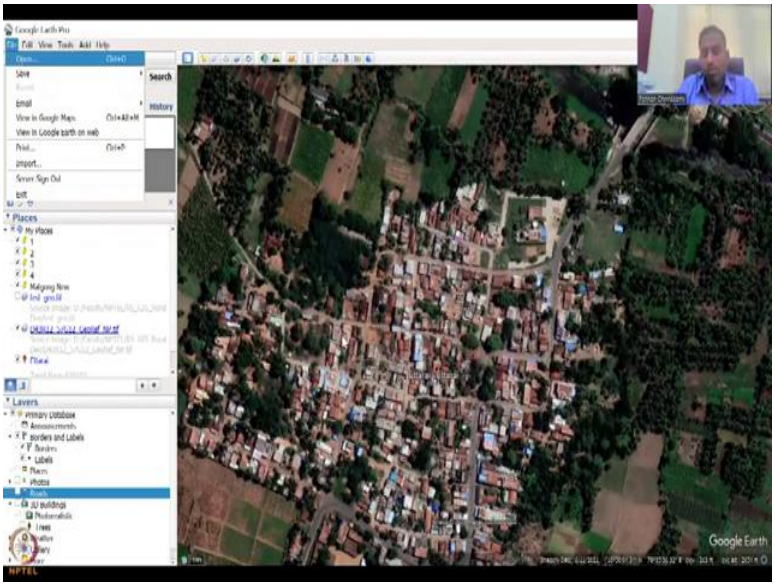

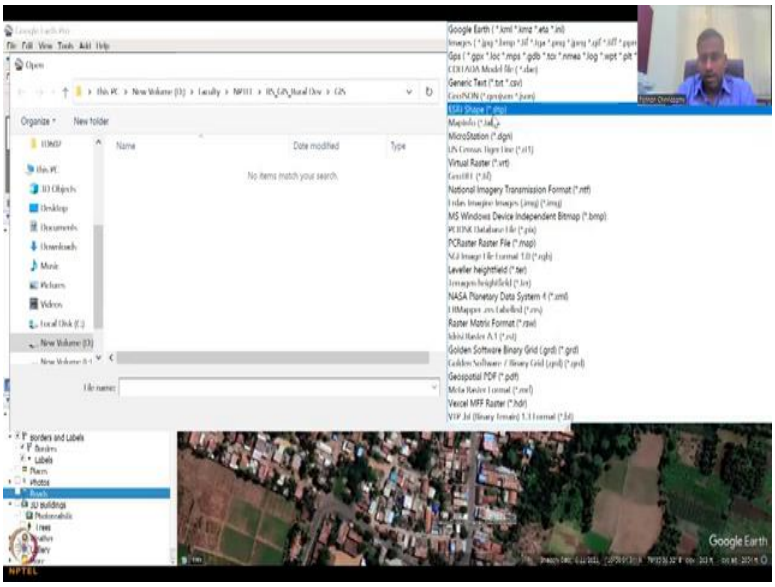

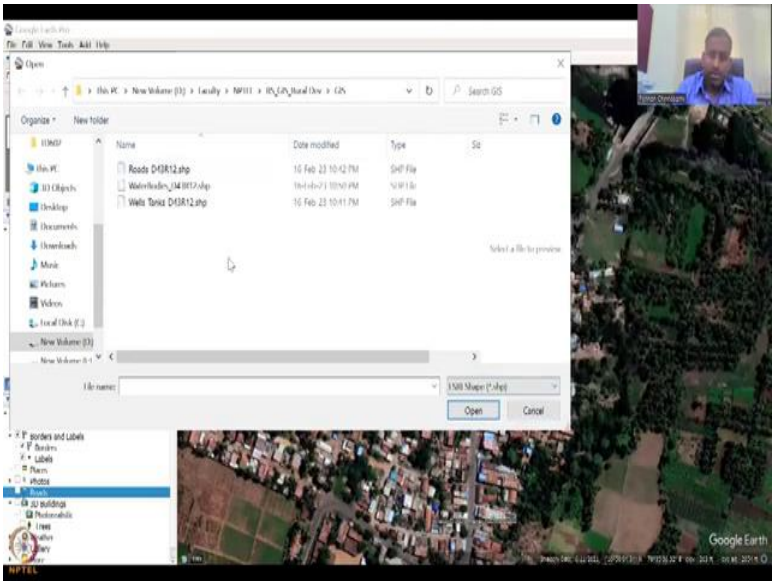

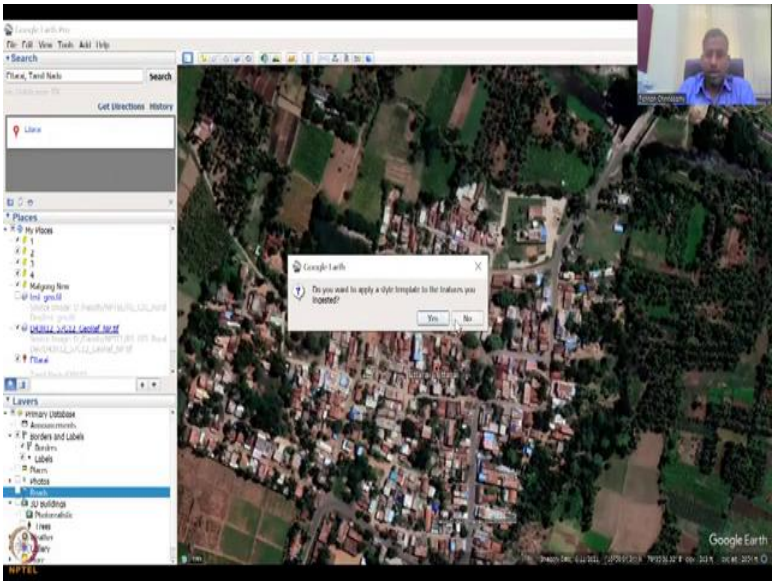
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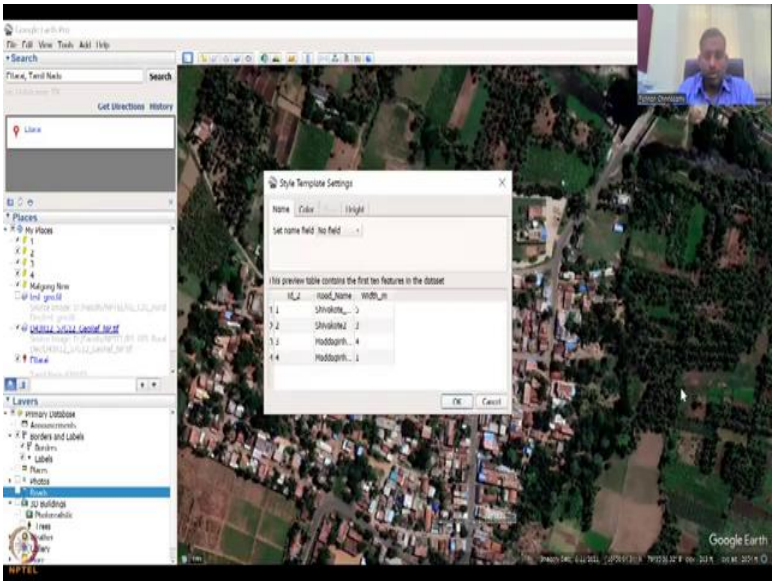
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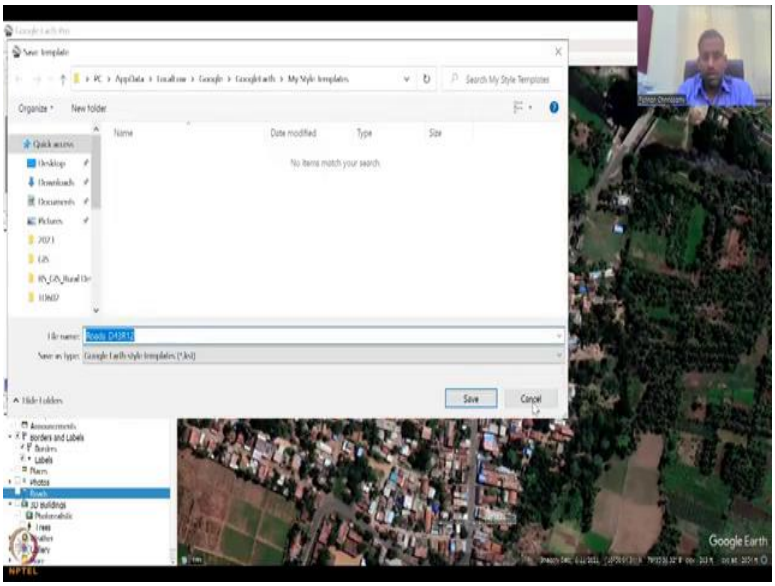
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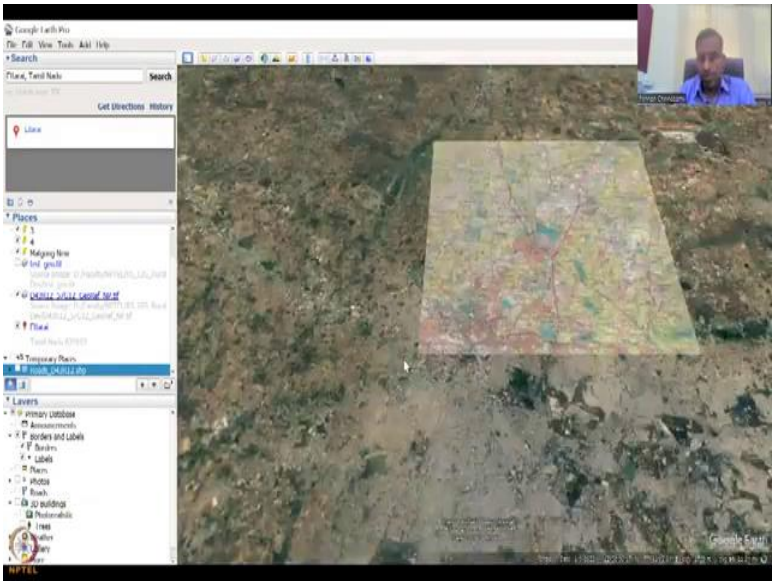

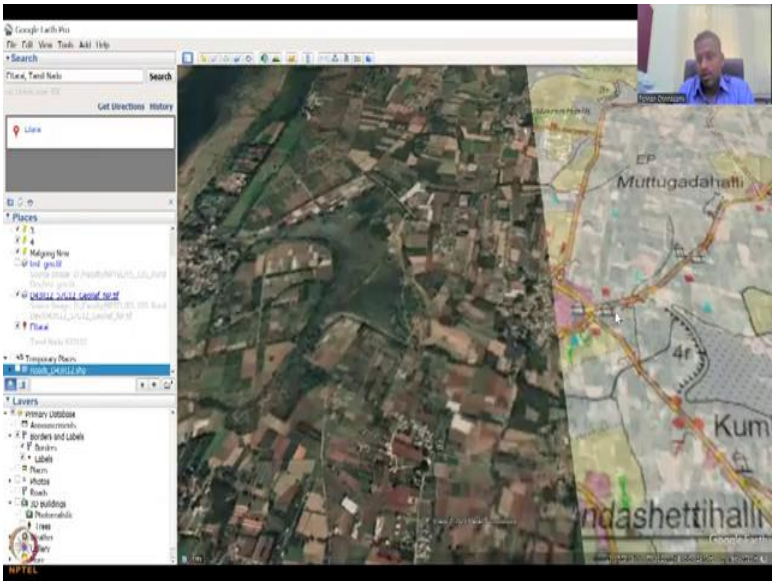
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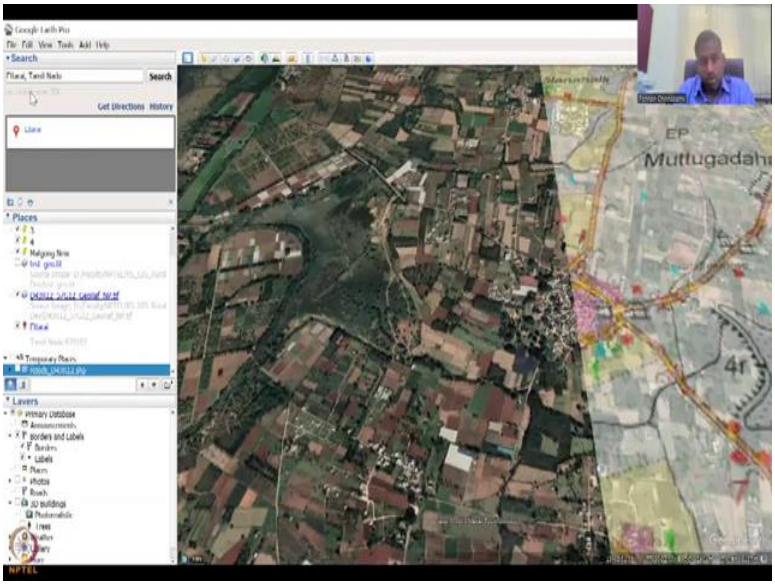
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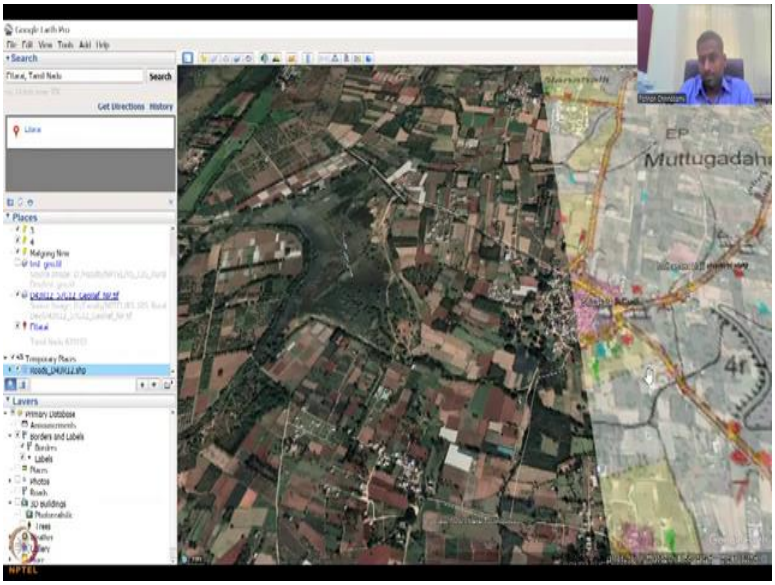
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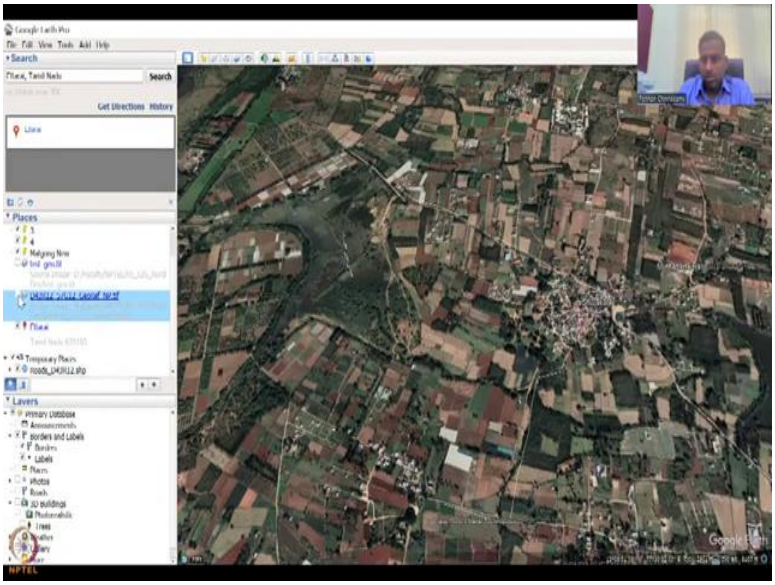
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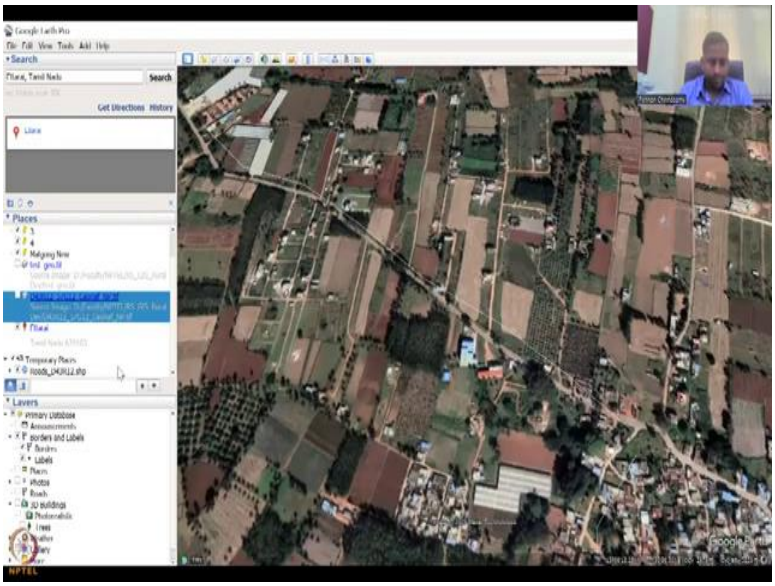
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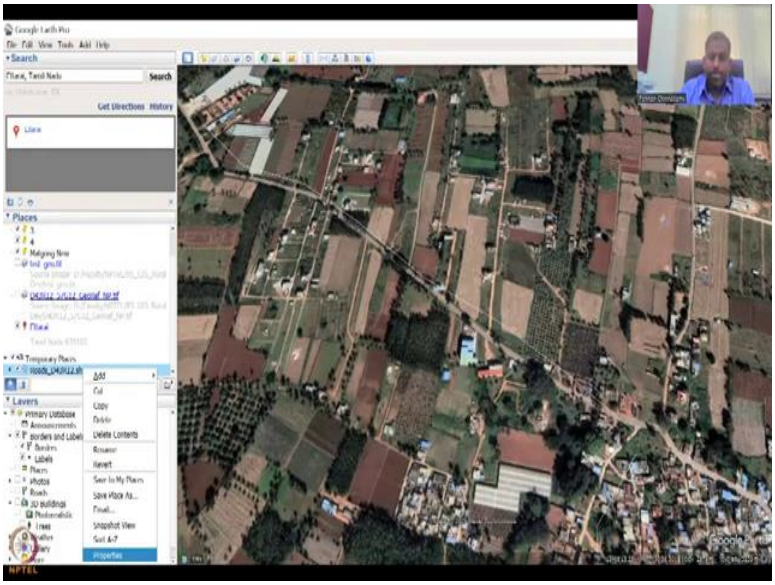

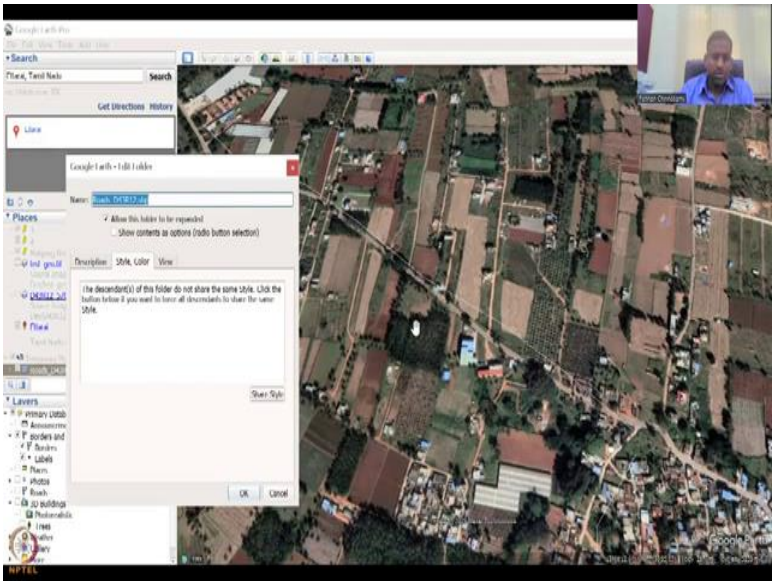

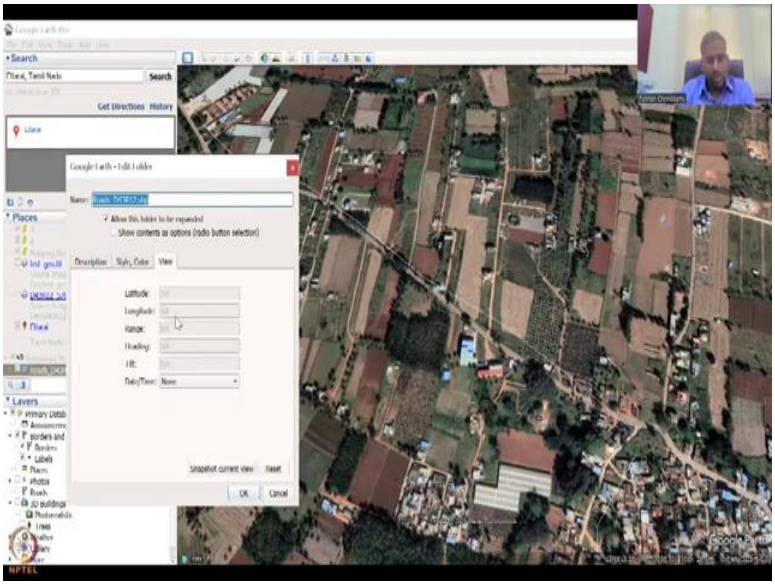

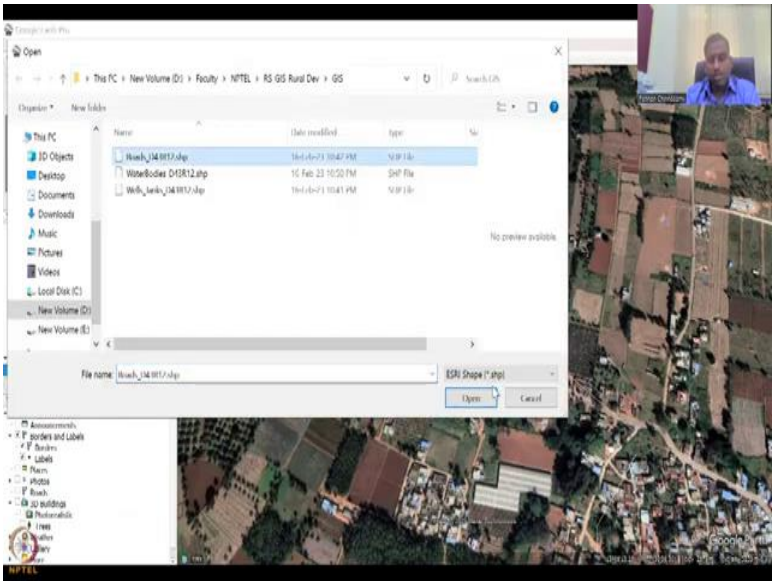
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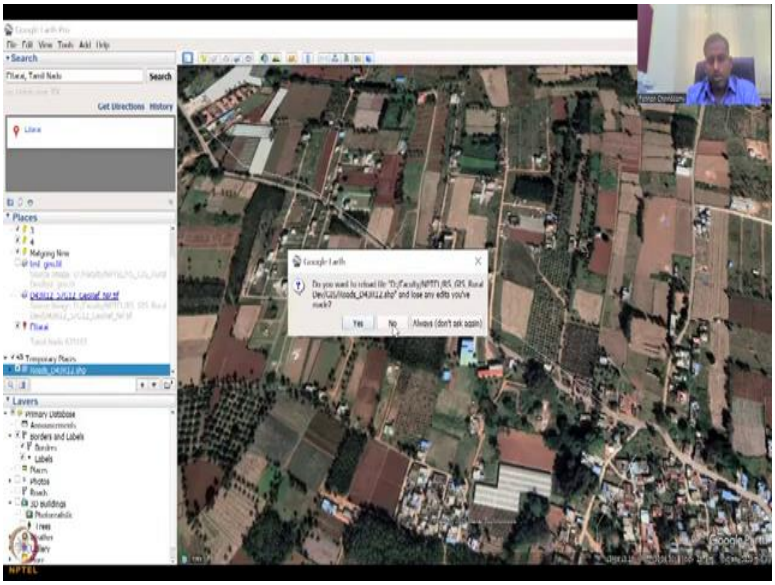
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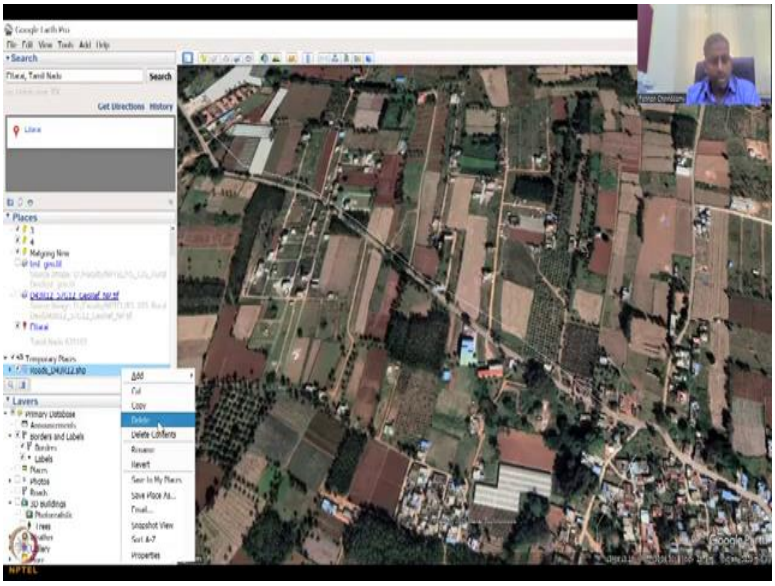
Search
Get Directions
History
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Delete Contents
Rename
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Save to My Places
Save Place As...
Email...
Snapshot View
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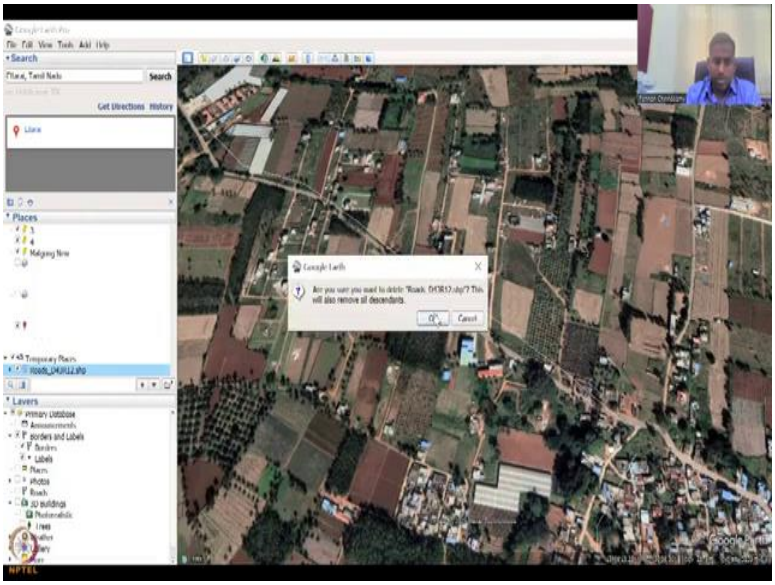
Properties

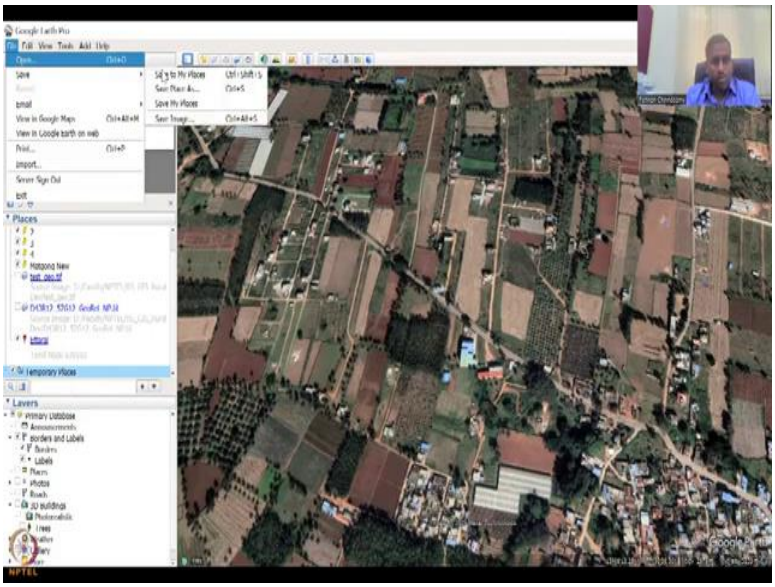


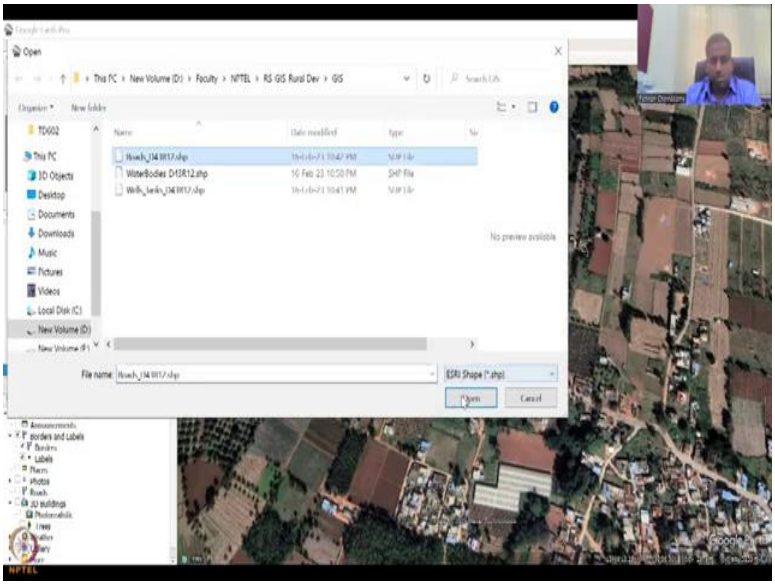
Here is where the file is where you can open and add layers. As I said we can open and then in my GIS file, it will ask what type of files you want to load, let us say I wanted an S3 shapefile and you see all your shapefiles come up. So let us say the roads that we built last time, do you want the same file style, yes, it will come, you can say okay, and then it will open up. Some boxes will open, do not worry about it just.

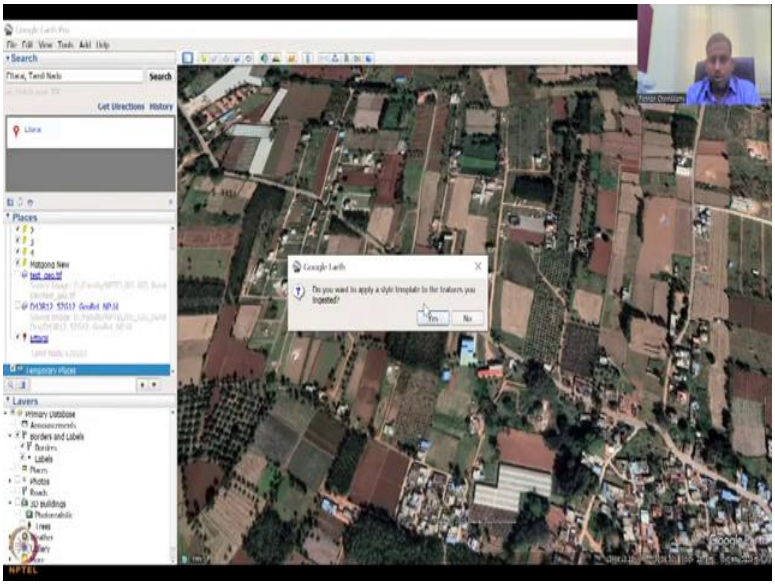
If you not say you have it, otherwise you can cancel it and here is where the roads come up. When it comes up, it comes in the temporary. As I said when you load, it comes in the temporary, click it, so that it comes up. So if the image is not letting you see it, you can take it out and then you can see the roads line. You can see this line, so this is the roads line. One thing is also in your places you can right click and then go to properties.

And then you can change the name, style, color, etcetera. So here you could see that the, you cannot see the line properly, but since we input the same styles you cannot, you cannot redo it, so you will have to import it again. Say open and then let us say roads, say open, do you want to say, no, we have to remove it again. So removing is also easy, you can say delete.

(Refer Slide Time: 30:30)






Google Earth Pro
File Edit View Tools Add Help
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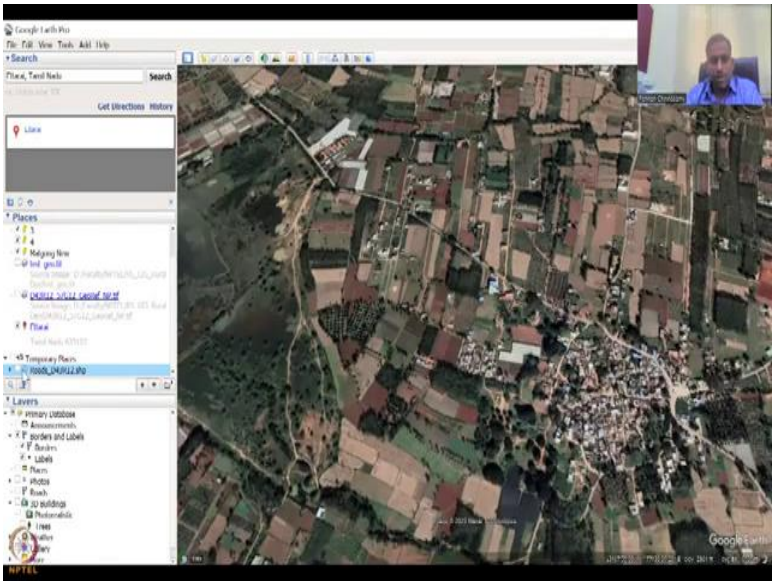
Google Earth
Do you want to apply a style template to the features you imported?
Yes
No
NPTEL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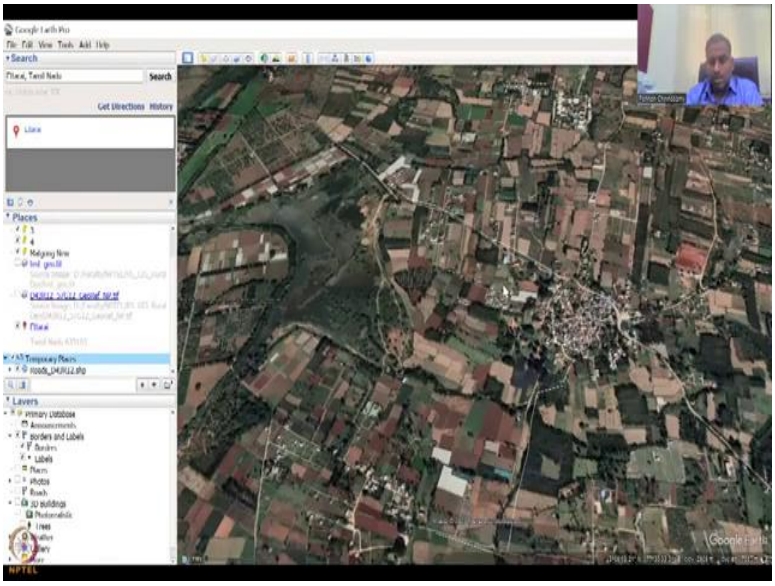
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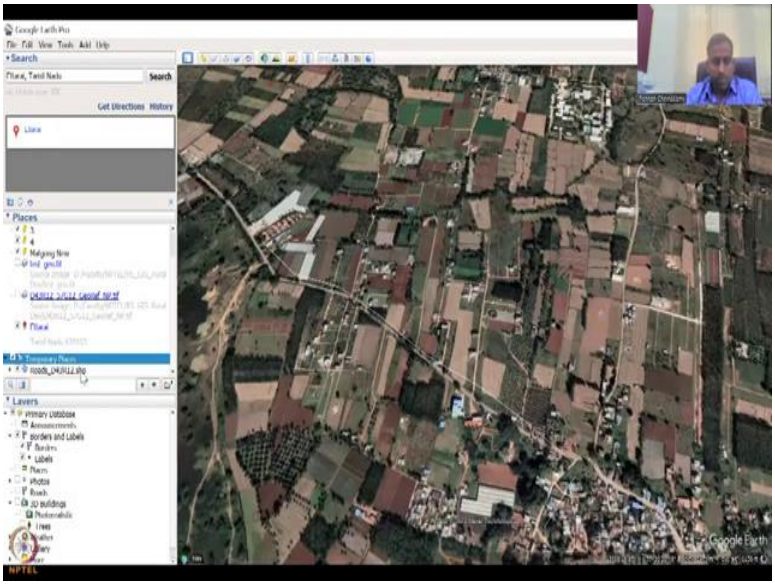

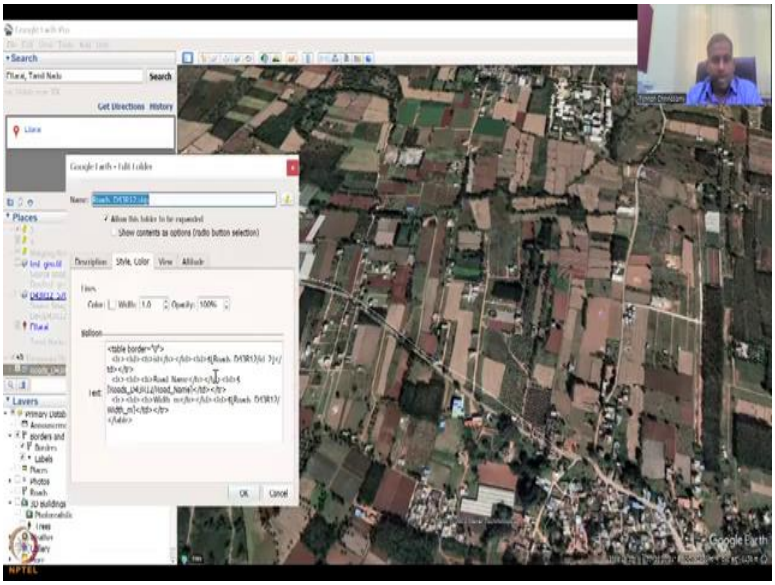

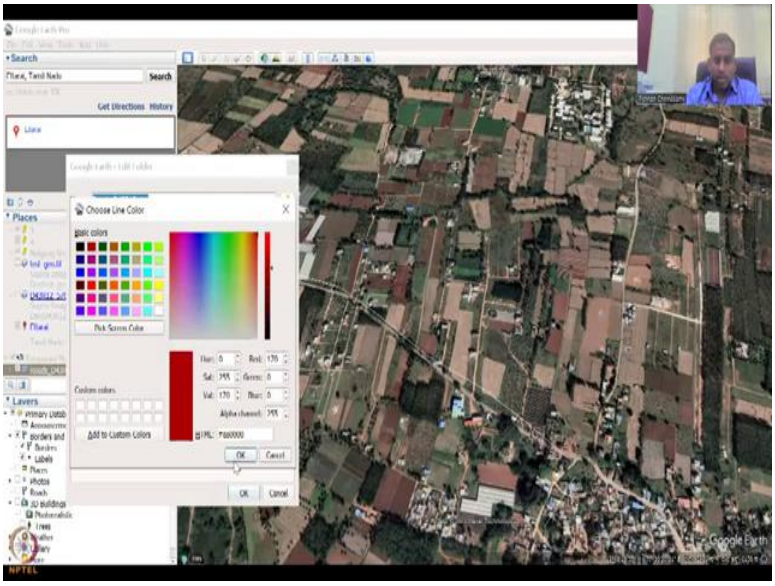

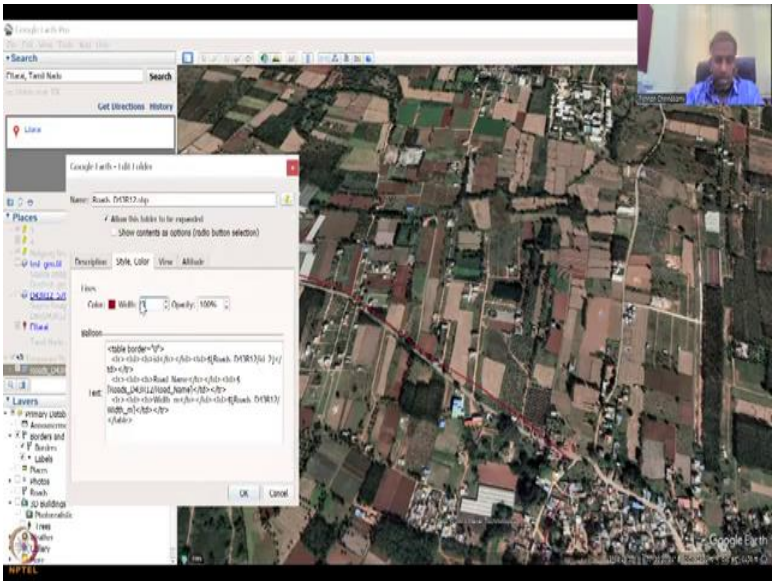
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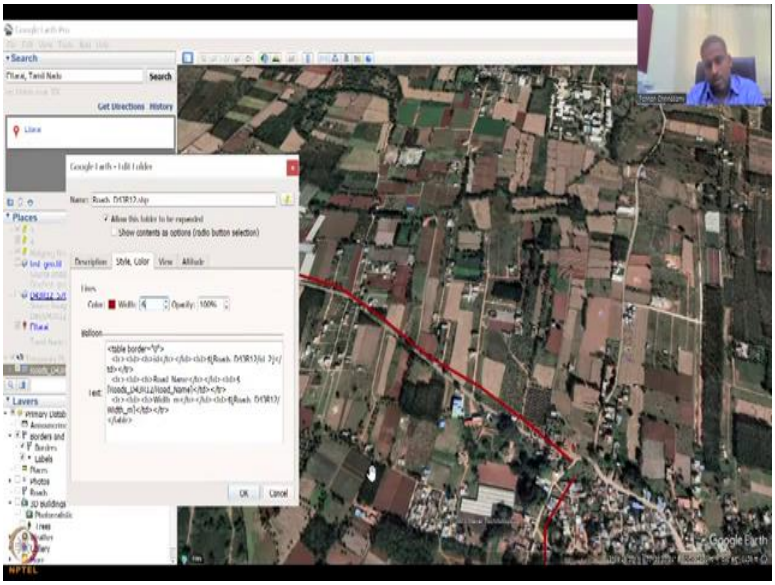
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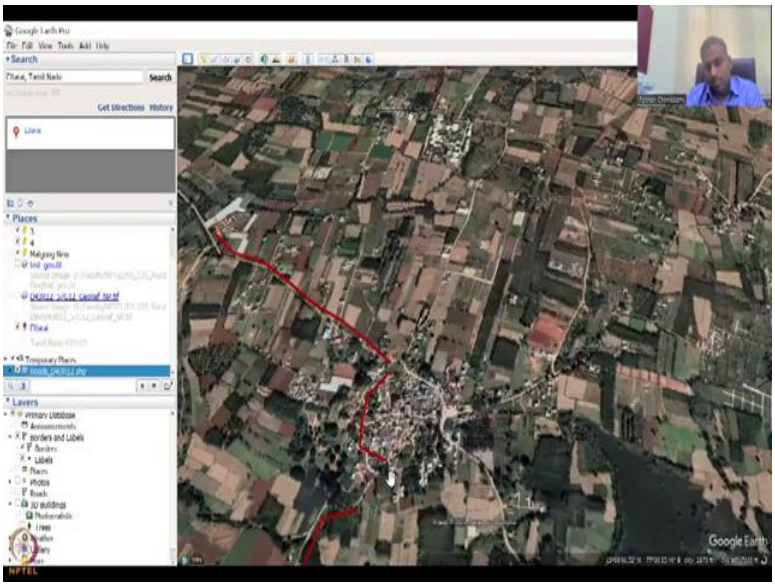
Search
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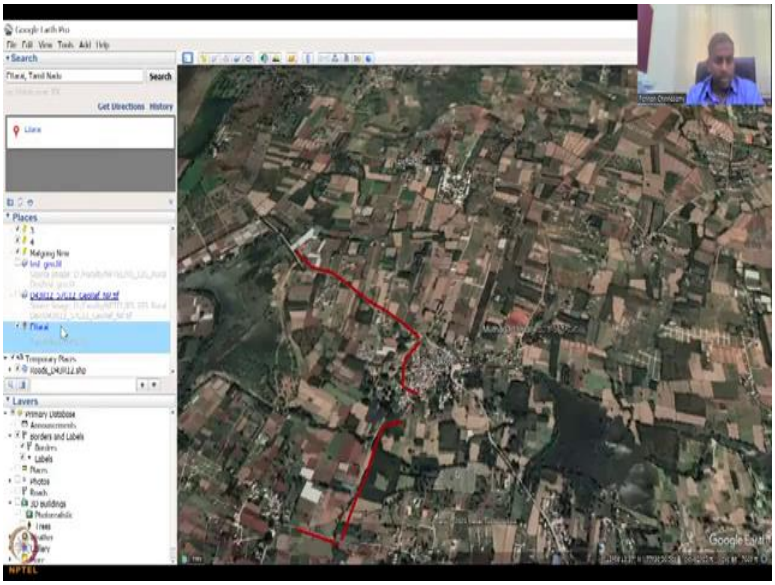
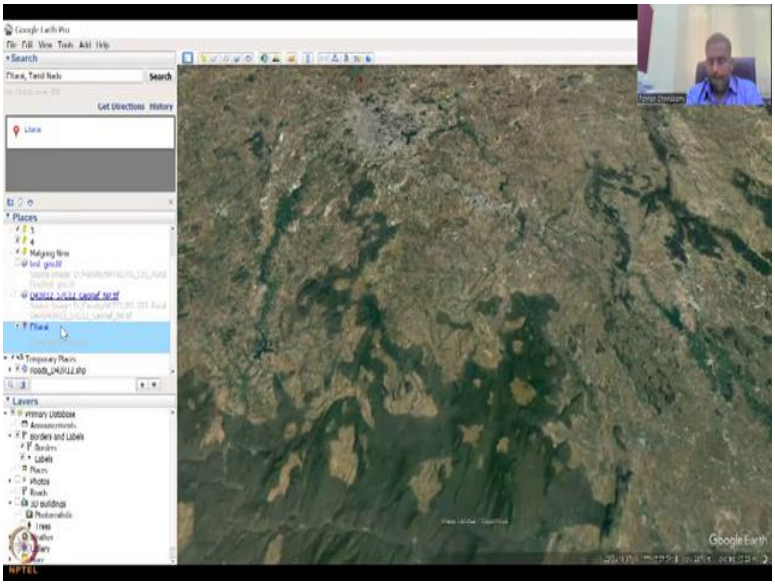
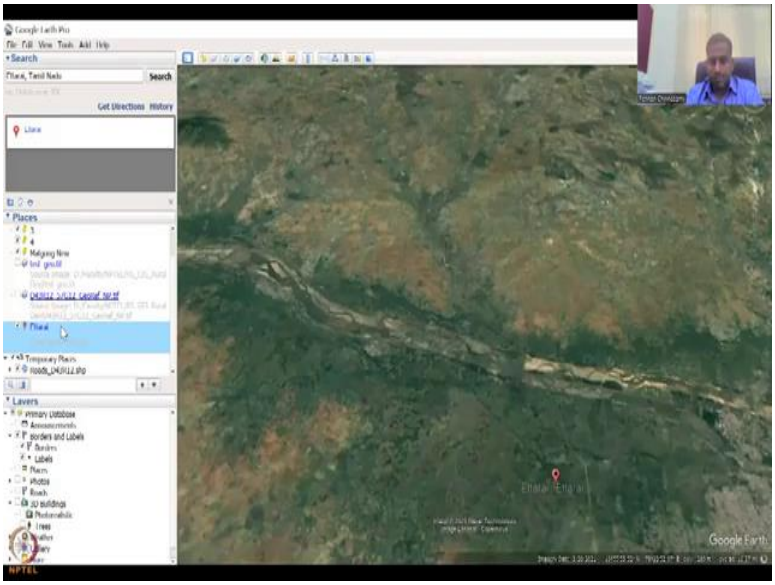
You can say open, roads, open, do you want to ingest for features, no, so let it ingest itself, a line, so now the line has come up. You can see how these lines are coming up, these are the roads that we gave. You can go to properties and you can go to style and color now, you can see that it is allowing you to change the color and the style.

Let us say okay, and then the width you can say three, width of the line, oh, it is too small. You can say six, now you can see the roads, I say okay. You see how we have done very perfect job in the mapping and then from the map we extracted the roads and all.

(Refer Slide Time: 31:11)



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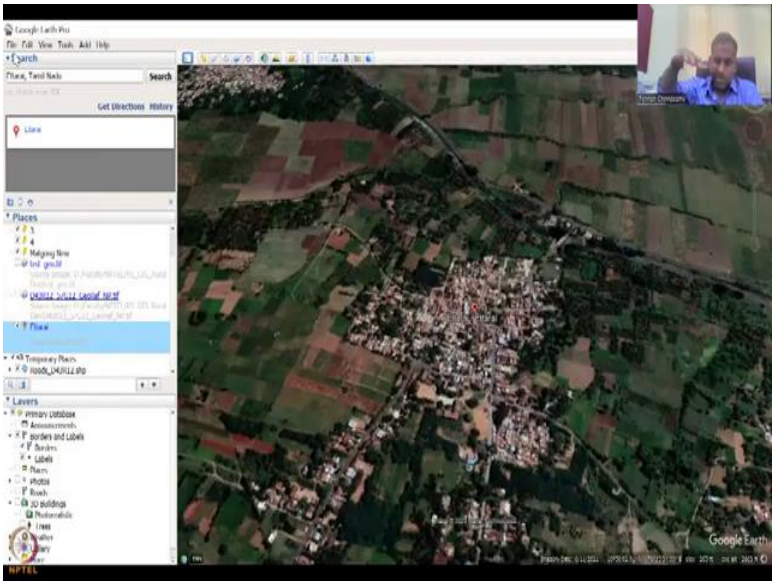
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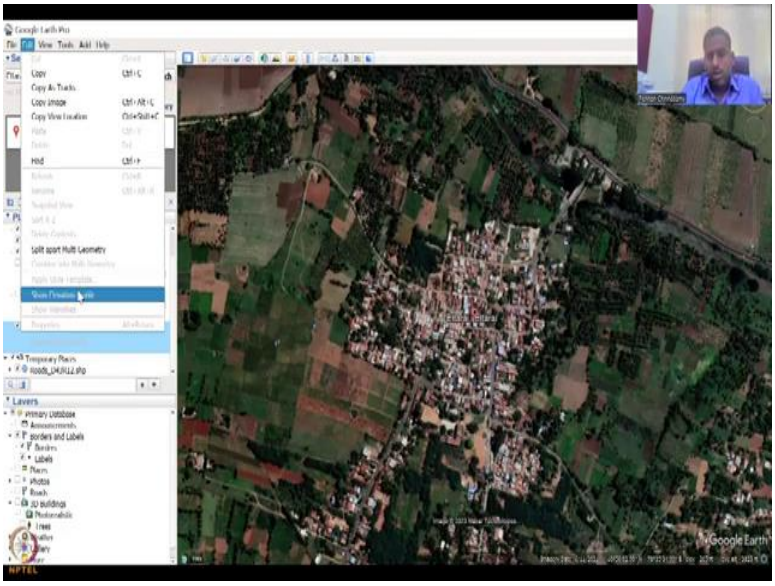
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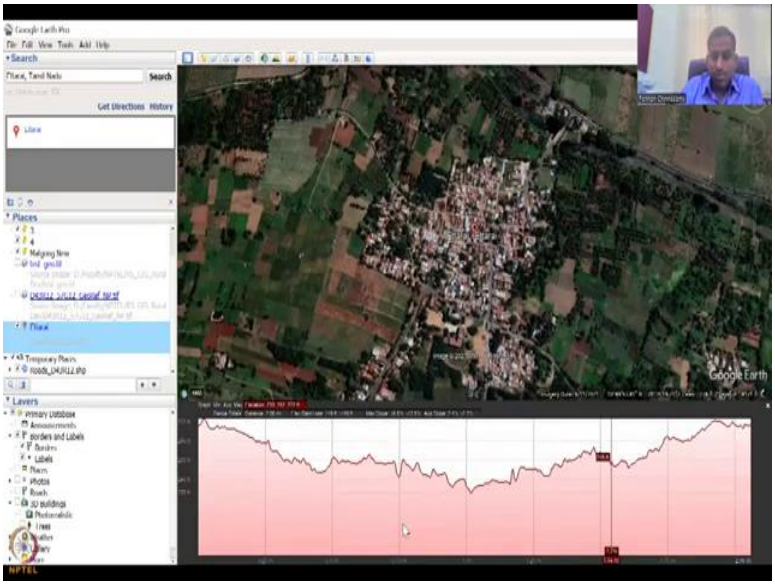
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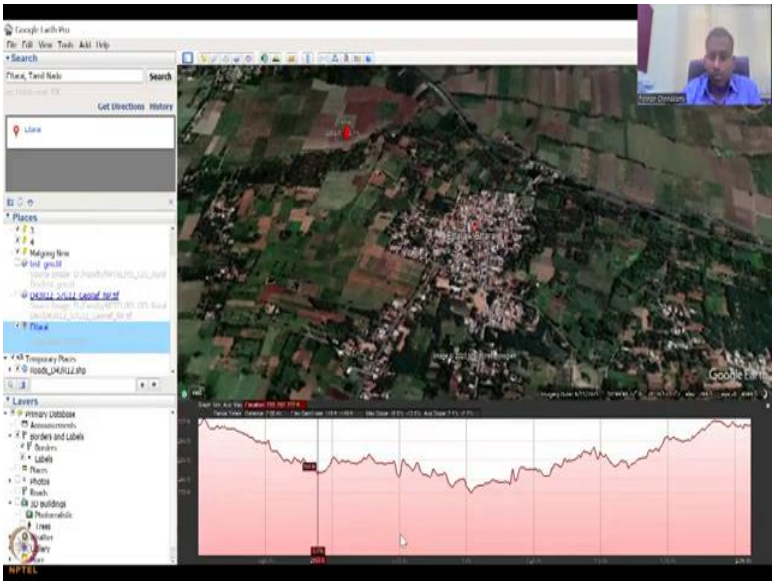
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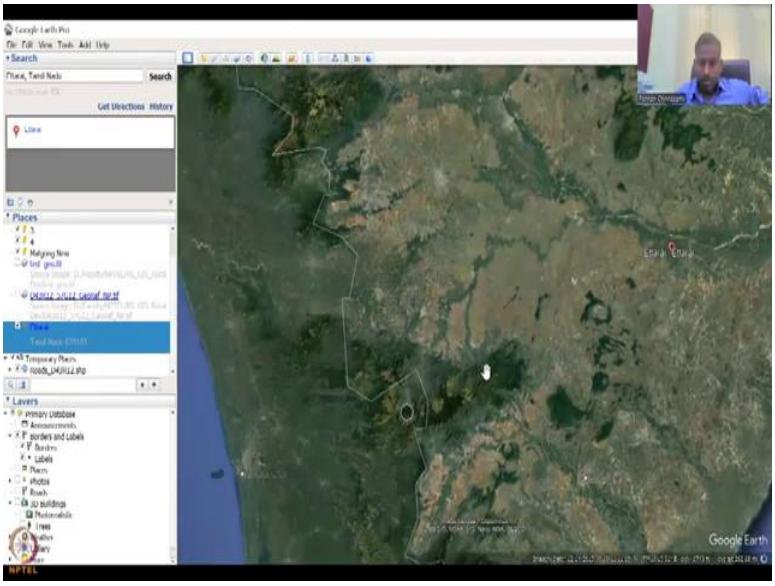
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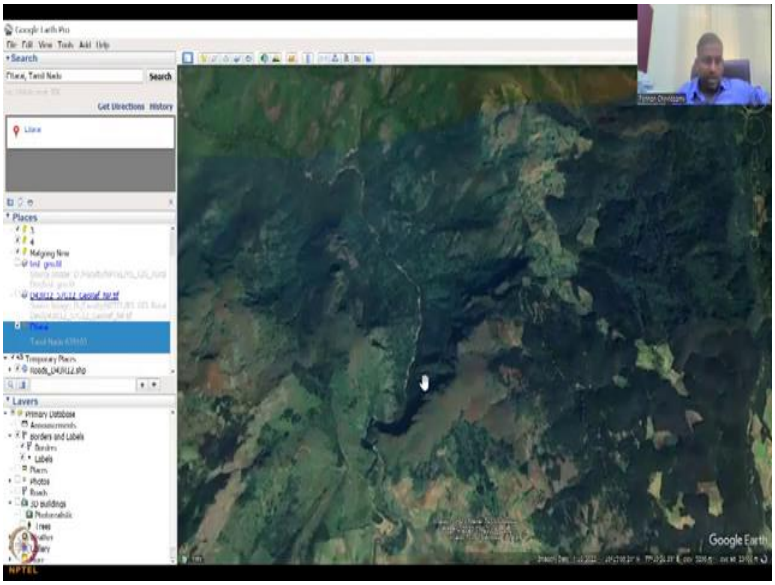
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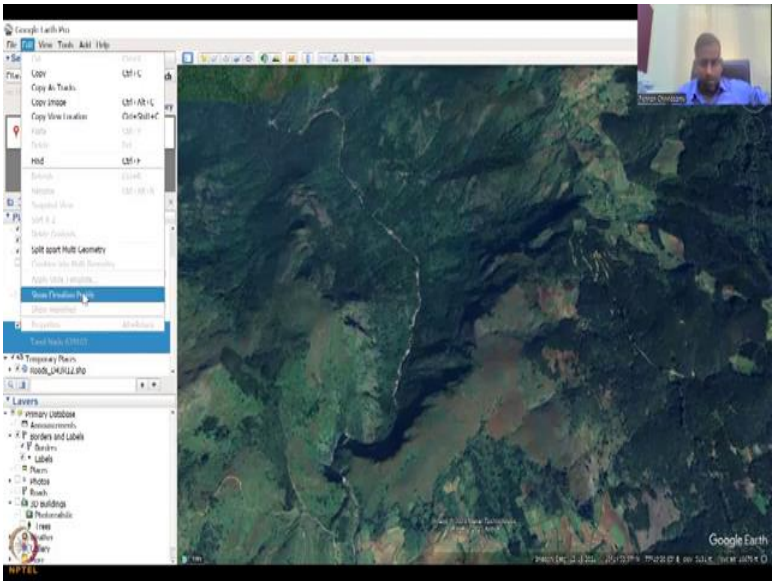
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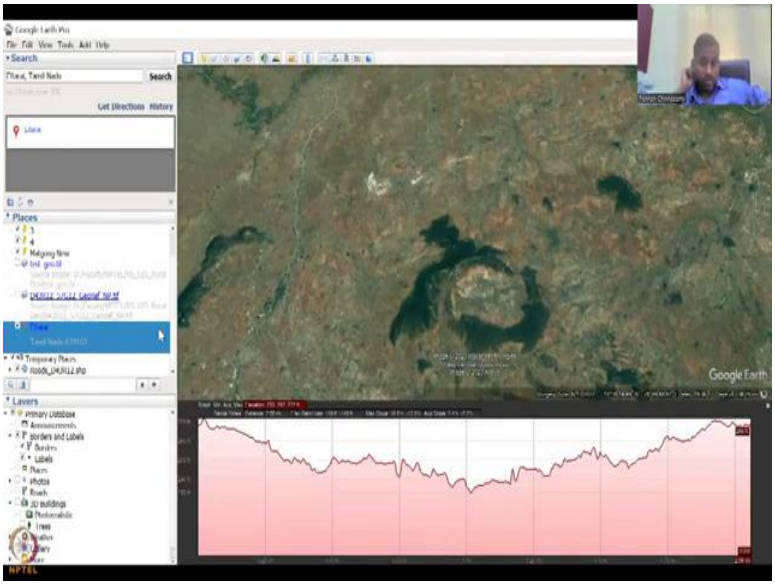
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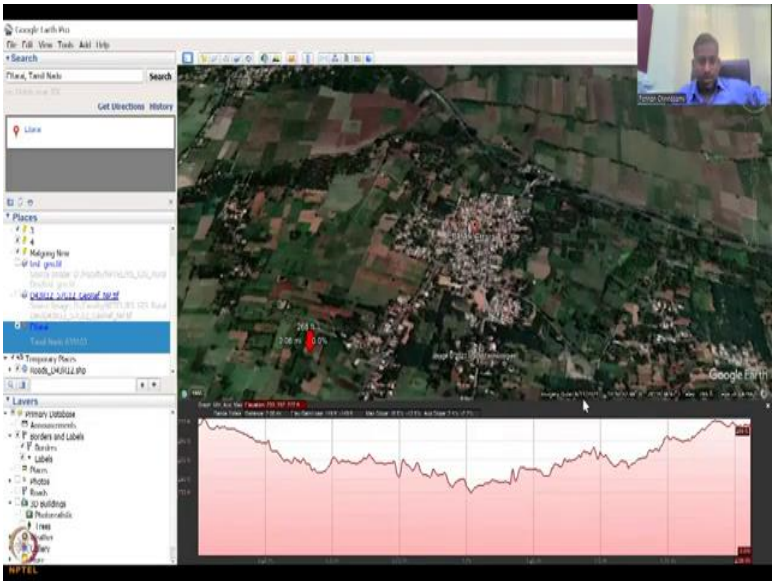

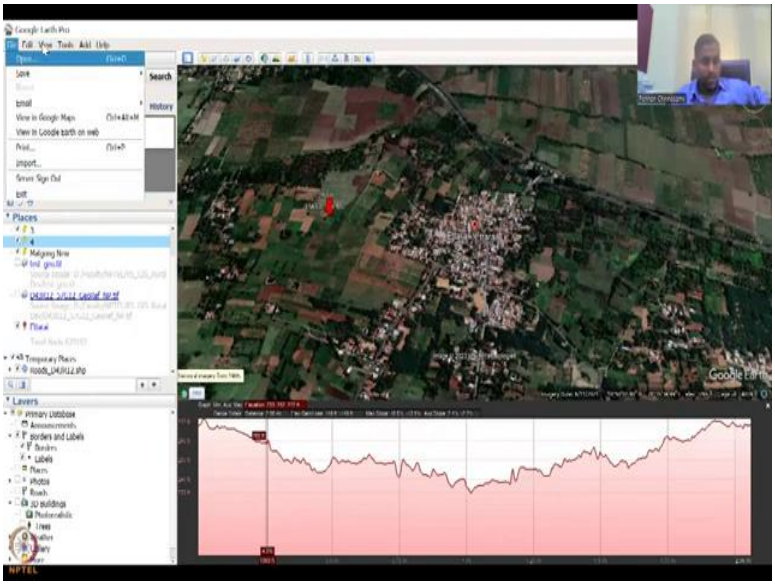

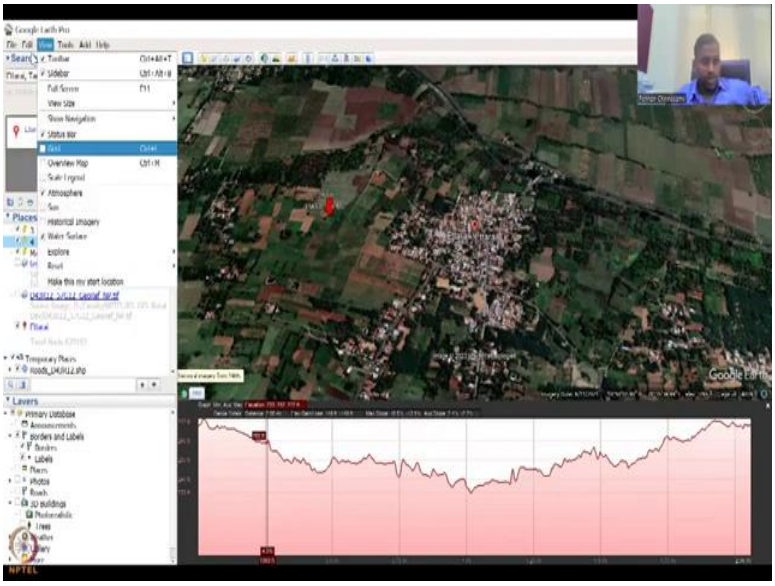

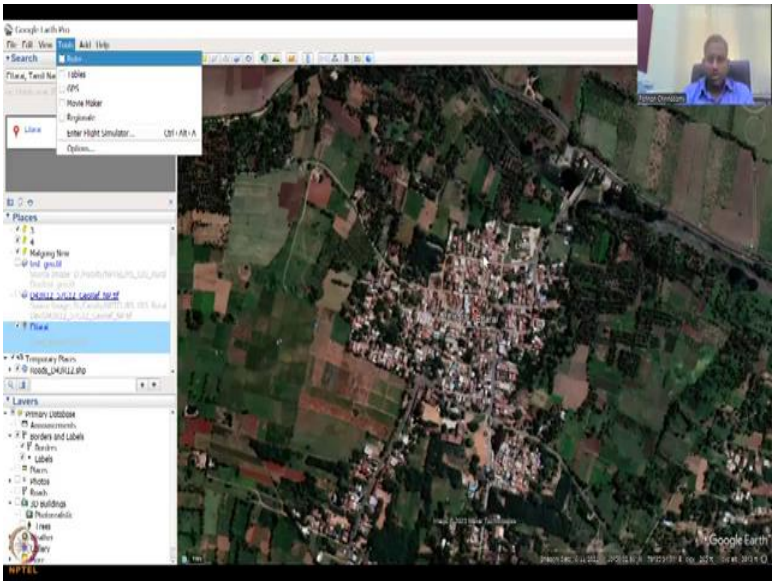
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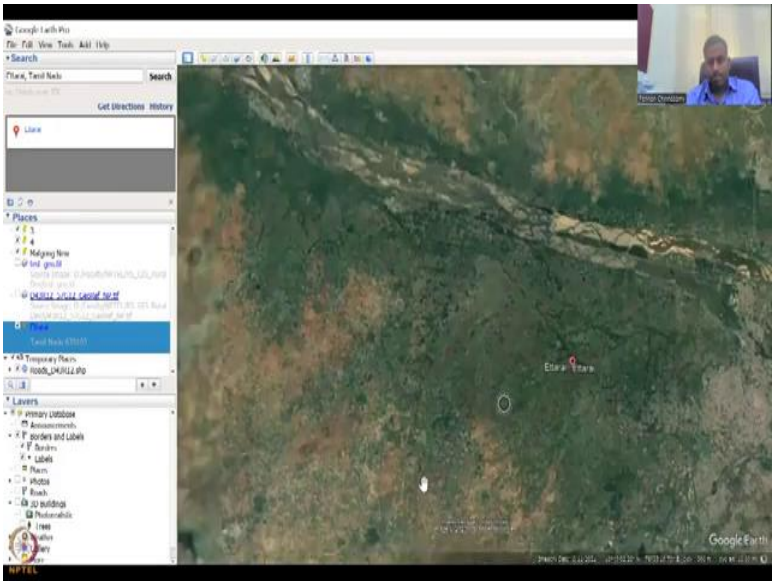
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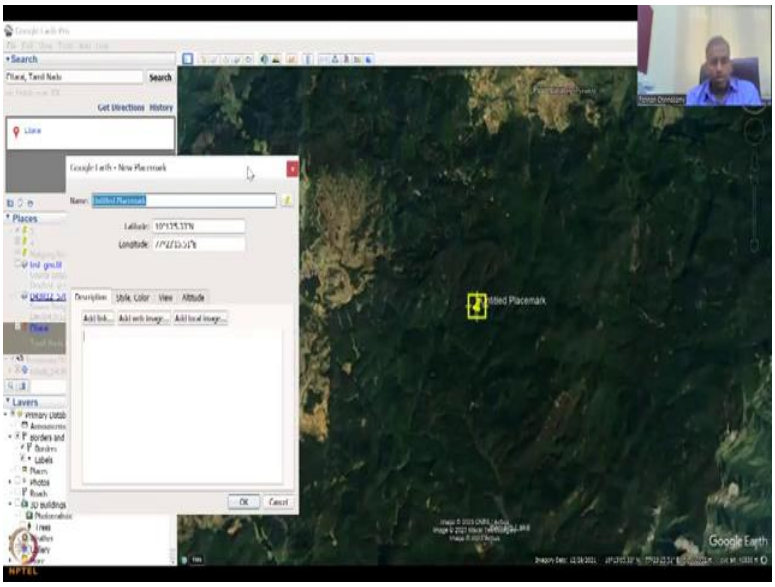
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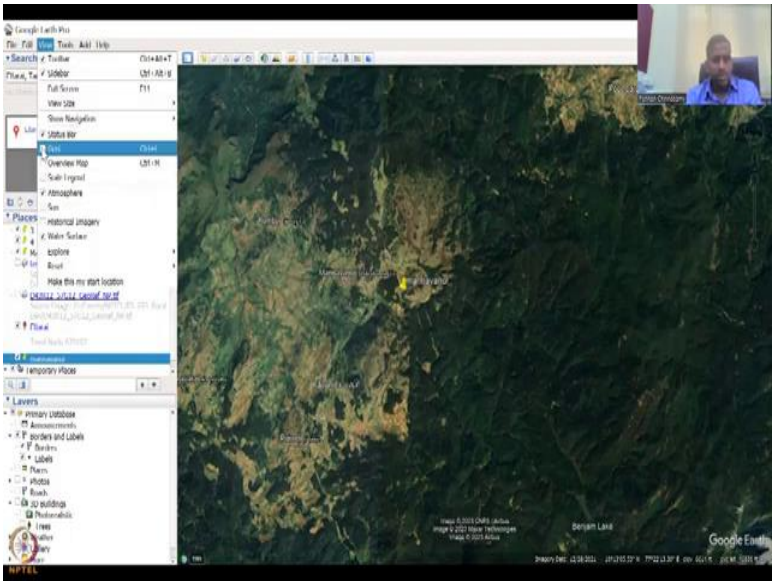
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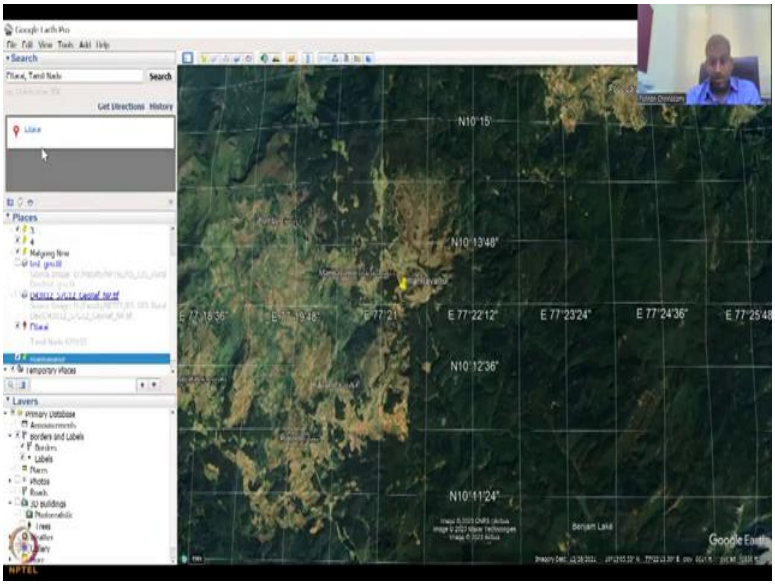
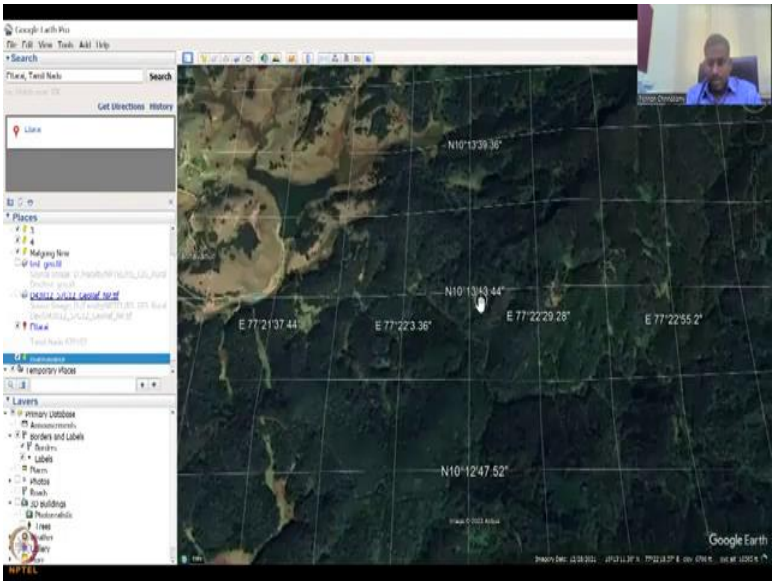

N10°15'
N10°13'48"
E 77°18'36"
E 77°22'12"
E 77°23'24"
E 77°24'36"
N10°12'36"
N10°11'24"
Google Earth


N10°13'39.36"
N10°13'43.44"
E 77°21'37.44"
E 77°22'3.36"
E 77°22'29.28"
E 77°22'55.2"
N10°12'47.52"
Google Earth

So let us go back to Ettarai. As I said it is still on this on the curve, I want it straight, so I go to view, reset and then tilt, so now it becomes straight. So this is on the left hand side. I will continue in the next class on the top model and then extracting georeference points. But let me take another, some more minute or two to just look into some data that you need. So if you do this to a elevation profile, for that location you could see how… the from here.

So basically if you move this pointer you could see that it is taking a transaction and in that transaction a cross section actually, it is basically a road a kind of a points between the images and then in that cross section it would take the elevation profile. So you could see that the elevation is high, but then it jumps down and then goes up in these locations. So is it good? It is okay because the elevation does not change much.

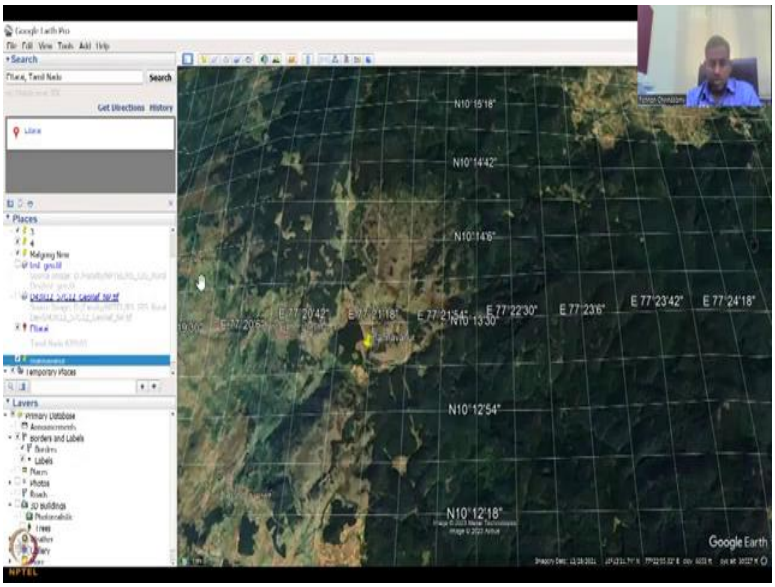
But if you go to the other locations such as Uttarakhand and hilly regions you will see a drastic change in the elevation. But let us go to the Western Ghats. So you can see here, so this is a valley and in the valley you can also see the elevation profile, view, edit, show elevation profile, it goes back to Ettarai because you have put a point, but you can also put a point here. And then, for that point it shows you the elevation profile.

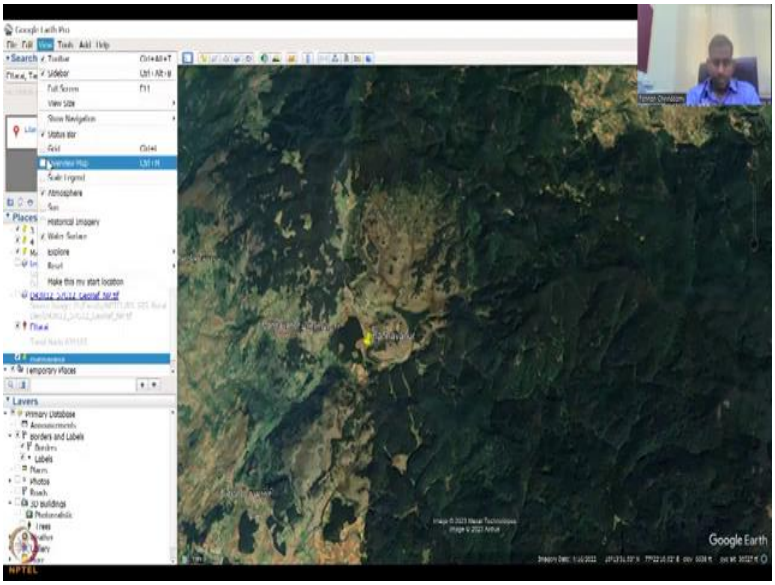
As an example let me click here and then view, edit, let us close this first. The units can be changed, but for now let us keep the units as this. Yes, so yeah, let me go back to the village, view, reset, then the tools are there, you can have ruler which is already there. That is a ruler. We will go through these tools later, GPS, Movie Maker, Rejuvenate, some are advanced but I will just go into the tables, rulers and stuff.

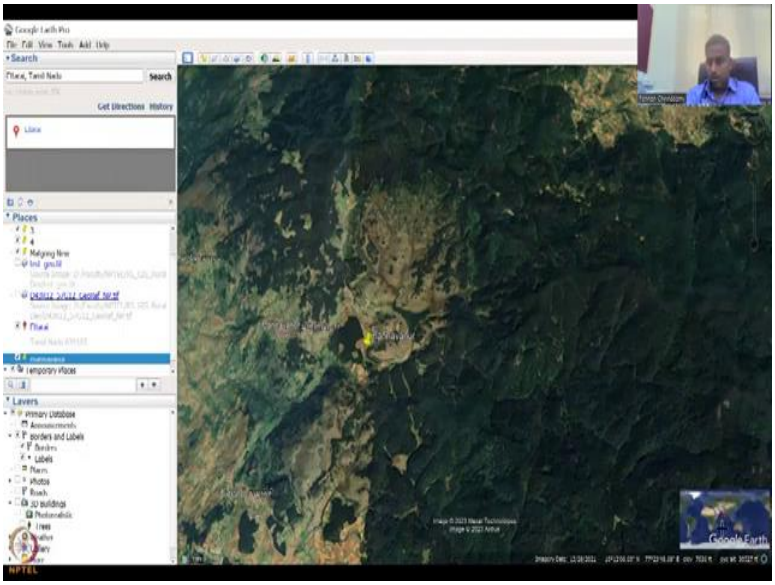
Add, you can add a point, path, polygon, we have done this in the past, so we have said, this is the location, let us say for example, I am marking this location. So you can put a point here and say Mannavanur, point Mannavanur so I put Mannavanur and then you can go to edit, and then look at, you want grids, full screen, etcetera. So grids will just add grids to your lines and this is the north side.

So now you could see that how you can extract the georeference points, which is going to be covered in the next lecture, but at least you could see that, ‘Oh, from this points I can extract a georeference point back into my map.’

(Refer Slide Time: 35:03)



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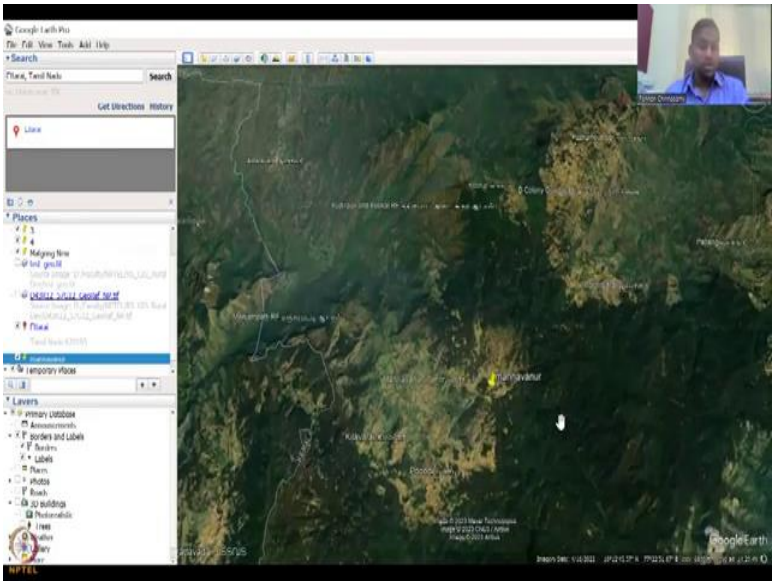
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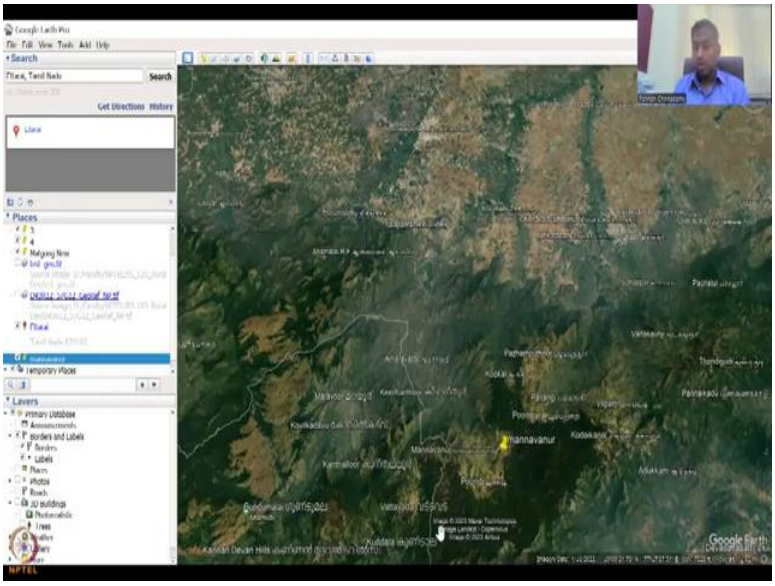
Google Earth Pro
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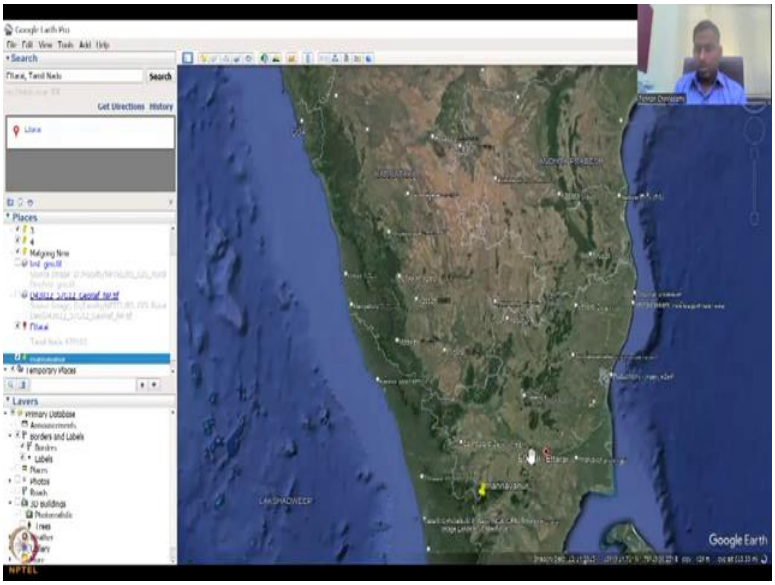
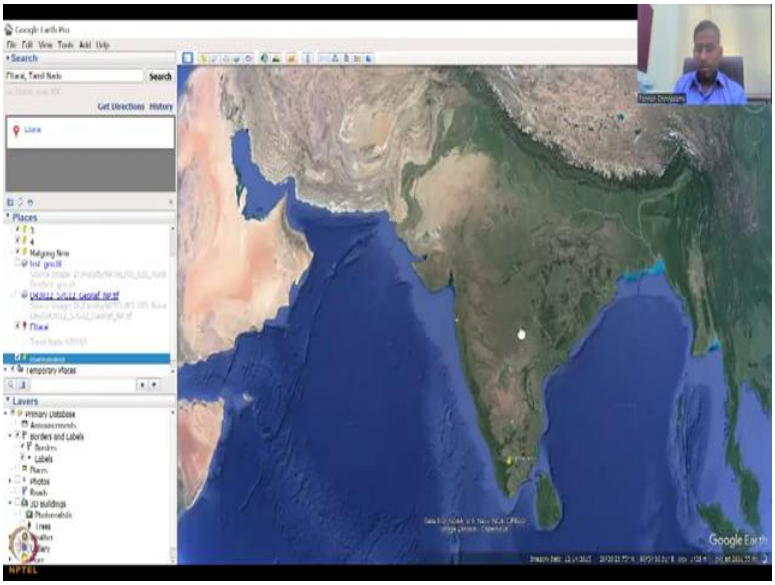
And then here you have the elevation profiles and while your pointer moves these also move, which is your location of the pointer, the lat and long, you could see at the bottom it moves. The most important thing is the imagery date, you can see that imagery date changes as you zoom in and zoom out, when you zoom in it is high resolution, not all data are taken every month. So you can look at that.

There can be an overview map to show where in location you are, on the right hand bottom you can see it and then a scale and legend, you can see to show that what length you have. So for example, this is the scale and legend, you can change the units also. So tools and other things we will do, help is to learn about this software and more importantly I will finish with the source of the image.

(Refer Slide Time: 36:00)

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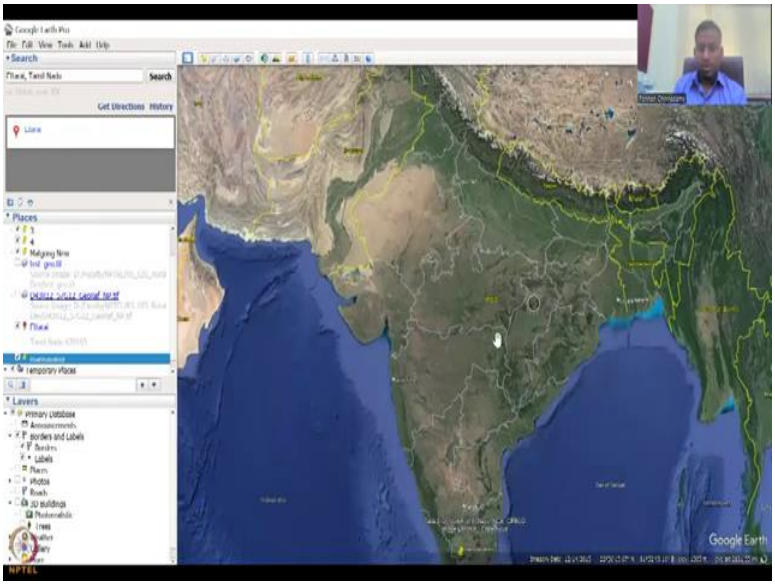
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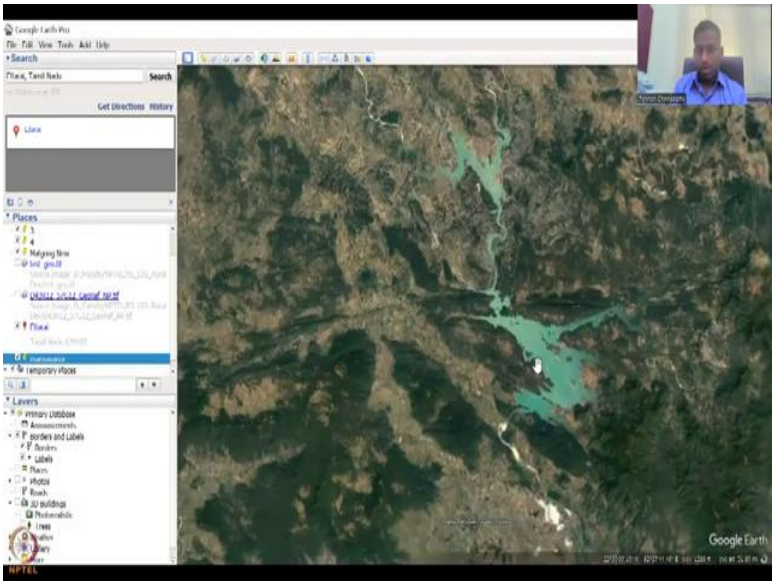
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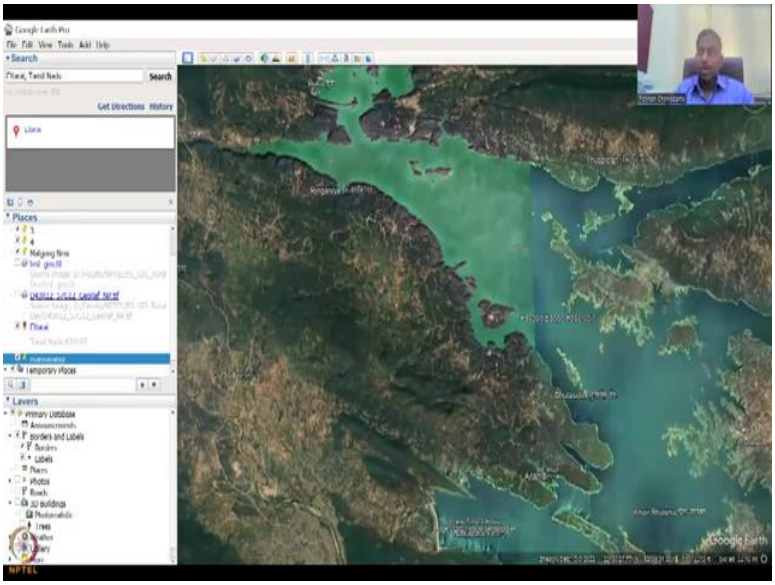
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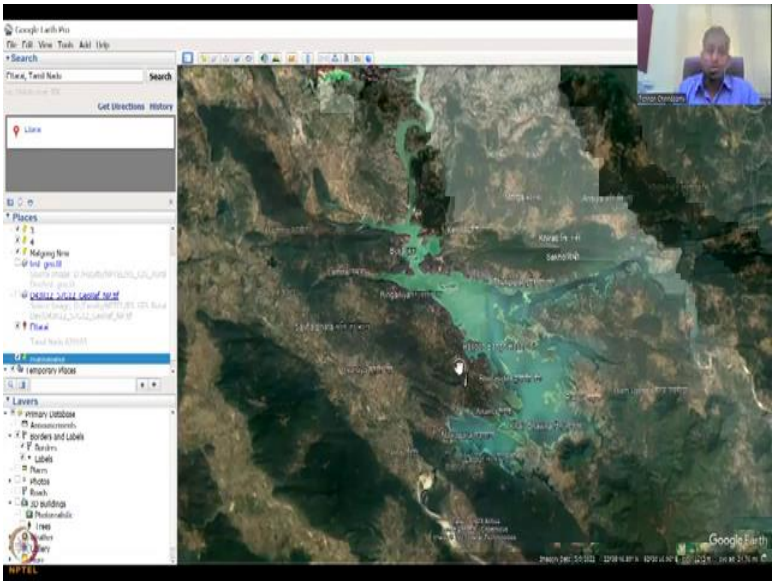
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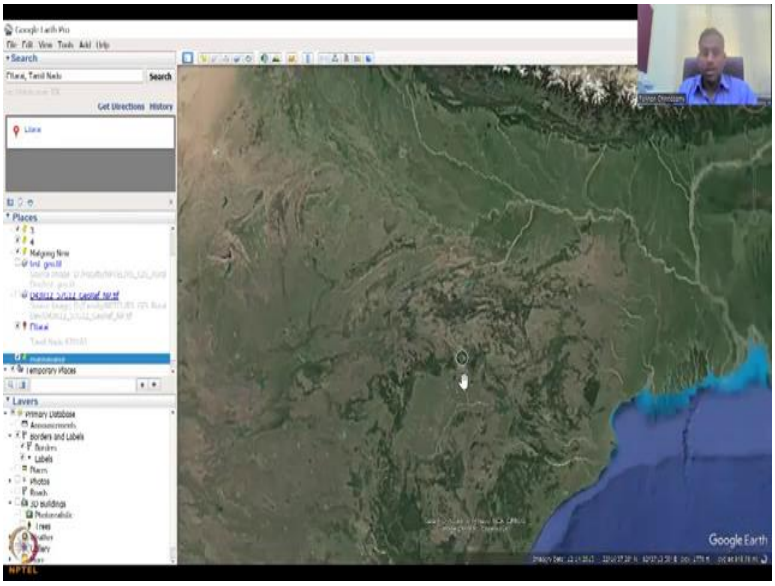
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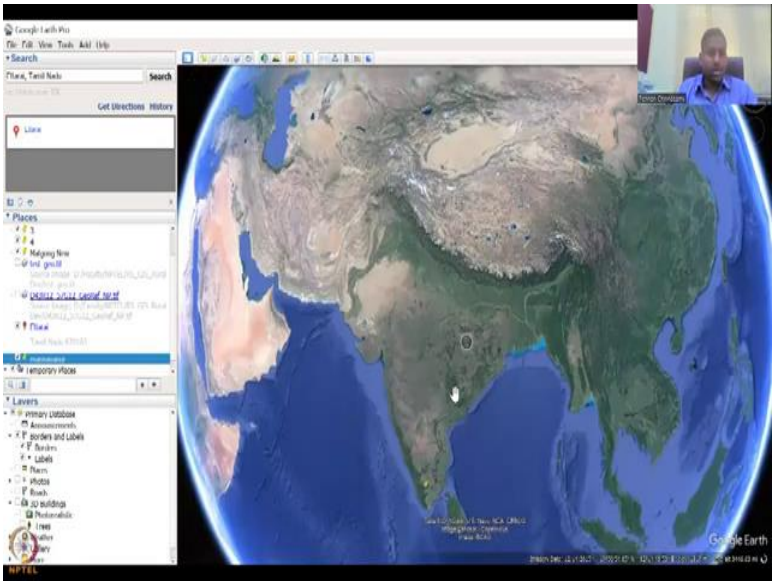
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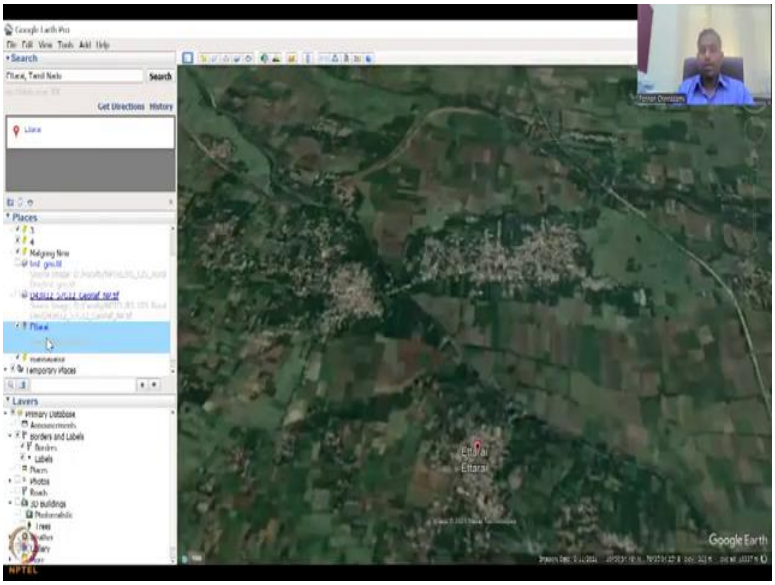
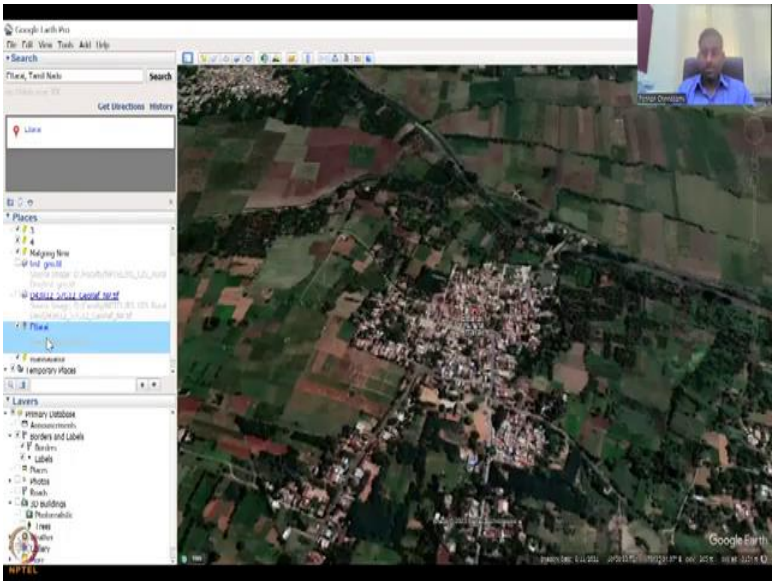

Ettarai
Google Earth
NPTEL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When you take an image from here you can thank Google Earth Pro, but always remember that the image is not Google's. So here you could see a copyright is from Max-Air Technologies and to CNAC Airbus. So the image has been made as a composite from two data, one is the Airbus and then the Copernicus Systems. And also, who does it, the Max-Air Technology does it.

So if you use, if you zoom in a bit and out you can see the sources changing, so this is the beauty of using Google Earth Pro. It picks the best resolution data for that particular location and time. So when you zoom in and zoom out, you will actually see that the data image source changes. Right here now it is Landsat, Copernicus and Airbus. So Landsat is taken from Copernicus database or NASA database and then they merged into this product for date.

And the date is 4-16-2022, but it was done or uploaded on 2023, so you have a copyright as 2023. So if you zoom out, you could see that the data also changes and the most stable versions they are using which is 2015, but if you zoom in some locations, example this water body you can see that, you can get data very, very much newer than the 2019 sites, 2022 you have, we will look into these other tools and getting data from Google Earth Pro in the next class. With this I will stop with again my village and I will see you in the next class. Thank you.