

# INTRODUCTION TO REMOTE SENSING FINAL EXAM

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Q1. One major step is to define the study region. Please show a map of your study region and explain how you define it? (15%)

I deemed that the most important part in the Taipei city is plain area, because, comparing with the mountain area, the business region and the most of population gathered in this region. In addition, there is more land development cases in plain area. (northern part of Taipei city is even Yangmingshan National Park.)

As a result, I use the dem data which provided by government and Qgis to help me define the plain region (altitude under 50(m)). Then, exporting it as shp file in order to derive the study region. The result of study region just like Figure 2.

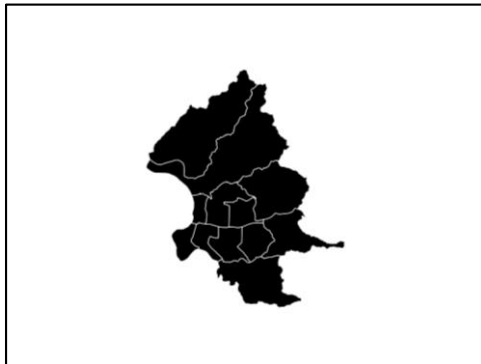


Figure 1: map of Taipei city

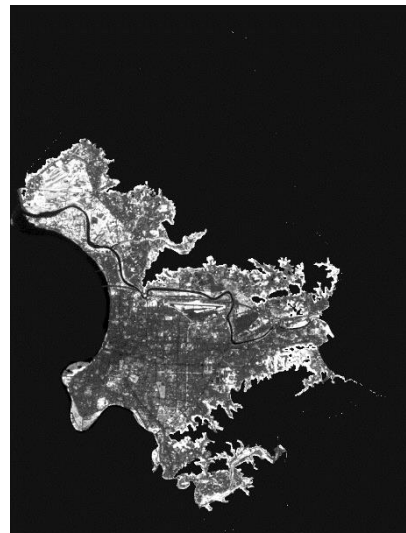


Figure 2: Taipei city under altitude 50(m)

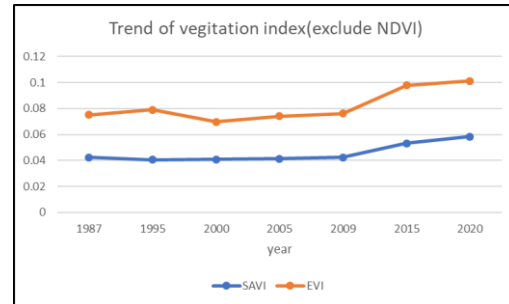
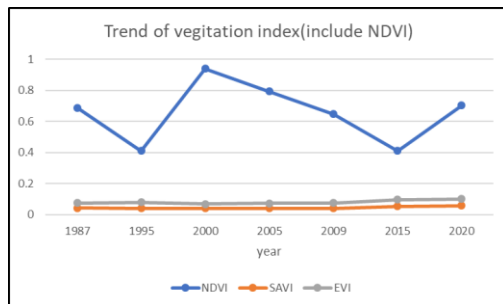
Q2. According to your analysis, overall, does the city get greener or not? Please justify your answer in details (15%) In addition, is the trend uni-directional (the 1987 greenness is the lowest [highest] point and the 2020 [or even 2021!] greenness is the highest [lowest] point) or multi-directional (greenness values go up and down)? Again, you need to justify your answer in details (20%) In order to answer this question, you may need to download and process new images.

In order to answer this question, I collect data of summer for 7 years (1987, 1995, 2000, 2005, 2009, 2015, 2020) (data before 2013: Landsat 5; data after 2013: Landsat 8) to find out their vegetation index value (NDVI, EVI, SAVI). The result is showed on the two graphs. We can observe that the value of NDVI has no regulation in these years. I speculate there has two reasons: (1) NDVI is easy to saturate in

Taiwan. (since we have lots of vegetation), (2) NDVI is sensitive to the environment.

As a result, I decided to only discuss the value trend of SAVI and EVI.

According to the data I conducted in ENVI, I found that the trend is not uni-directional but multi-directional. Greenness has once dropped in 2000, and then, gradually increased after the year. Overall, I think Taipei city get more greener in these 33 years.



Graph 3: Trend of vegetation index(include NDVI)    Graph 4: Trend of vegetation index(exclude NDVI)

Q3. Let's look at the data more closely. We will mainly focus on 1987 and 2020 these two time periods. Please find sizable locations with the significant trends of "greening up" and "greening down" (one for each). Moreover, please tell me the stories and histories about these sites. Additional information such as aerial photos, GIS layers, scientific literature and reports from other sources are strongly encouraged. However, use Landsat imagery as your main data source. Please check previous years' Mapbooks (<https://sites.google.com/site/choyhuang/index/courses>) for more information. (50%)

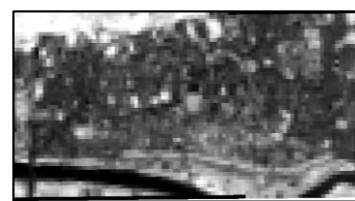
#### A. Less greenness



1987 EVI



2005 EVI



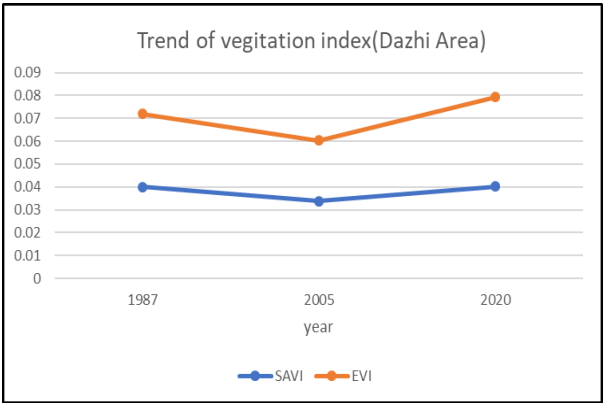
2020 EVI

The area I conduct research is Dazhi, area of cut-off of Kee-lung river.

From the right graph, we can easily find that there are lots of vegetation turn into buildings. Originally, this place is course of Kee-lung River and some farm. After the plan of river cut-off in 1992, people started to construct a lot of building in this area.

Then, observe about the line chart below. There has an obvious value of EVI and SAVI drop in 2005, because of the reason showing above. However, interestingly, in

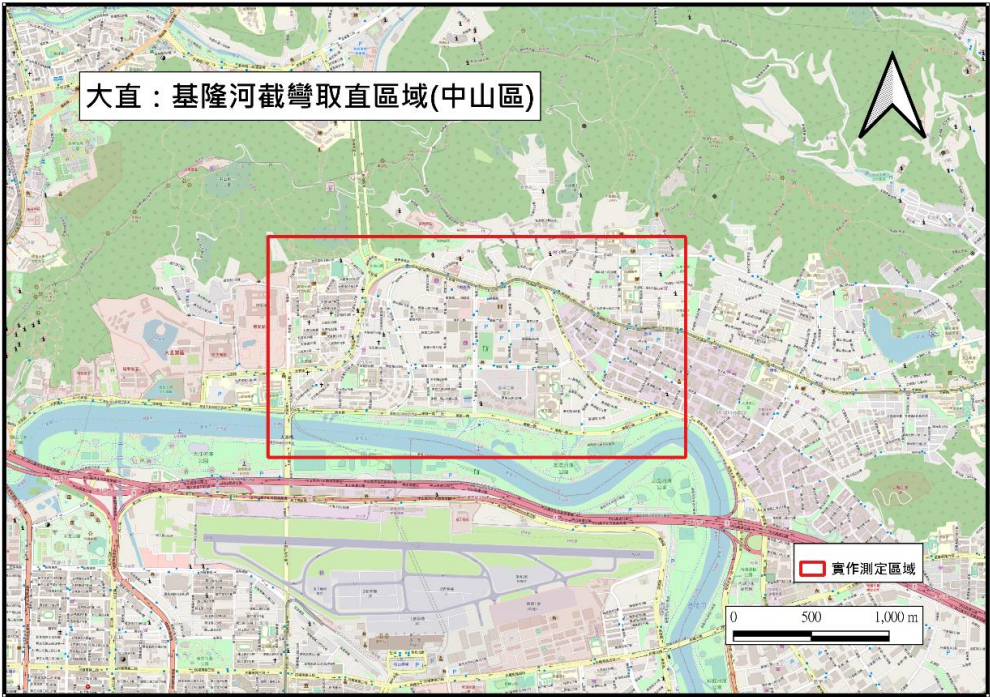
2020, the value rebounded. I suggest the reason to be after lots of building development, they started to plant trees and construct parks, and this make it more greener.



Graph 5: Trend of vegetation index (Dazhi Area)

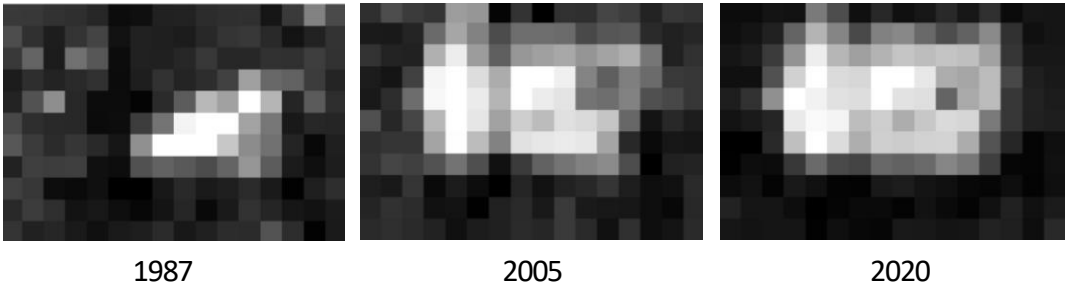
Graph 6: 1992 and 2020 Aerial photos(Dazhi Area)

Resource from: <https://www.historygis.udd.taipei.gov.tw/urban/swipe/index.aspx>



Graph 7: researching area

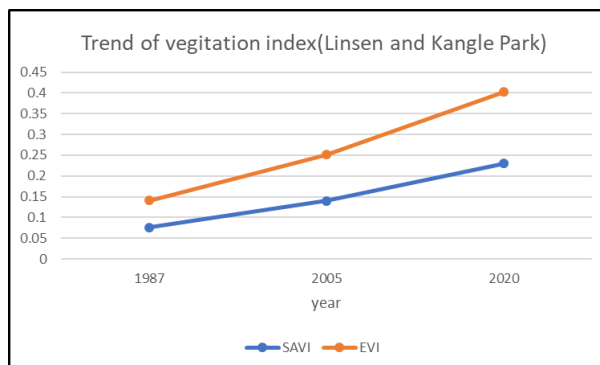
B. More greenness





The area I conduct research is Linsen and Kangle park. Originally, this area is military village and market. However, from Japanese occupation era, this land was planned to construct parks, but this area had much population at that time. As a result, the government postpone the project at that time. In 1997, the government restarted this plan. After a lot of protest campaign, this military village and market still was removed from that place and became two parks.

In the line chart below, we can obviously observe that the value of EVI and SAVI get higher and higher. It indicates that this place gets greener and it's uni-directional increase.



Graph 8: Trend of vegetation index(Linsen and Kangle park), left

Graph 9: 1992 and 2020 Aerial photos(Linsen and Kangle park), right, resource:

<https://www.historygis.udd.tapei.gov.tw/urban/swipe/index.aspx>



Graph 10: researching area

## Reference data

1. <https://www.historygis.udd.taipei.gov.tw/urban/swipe/index.aspx>
2. openstreet map
3. <https://zh.wikipedia.org/wiki/%E5%A4%A7%E7%9B%B4>
4. <https://zh.wikipedia.org/wiki/%E6%9E%97%E6%A3%AE%E5%85%AC%E5%9C%92>
5. <https://zh.wikipedia.org/wiki/14%E3%80%8115%E8%99%9F%E5%85%AC%E5%9C%92%E5%8F%8D%E6%8B%86%E9%81%B7%E9%81%8B%E5%8B%95>
6. google earth engine
7. google earth explorer