

INTRODUCTION TO JAVASCRIPT

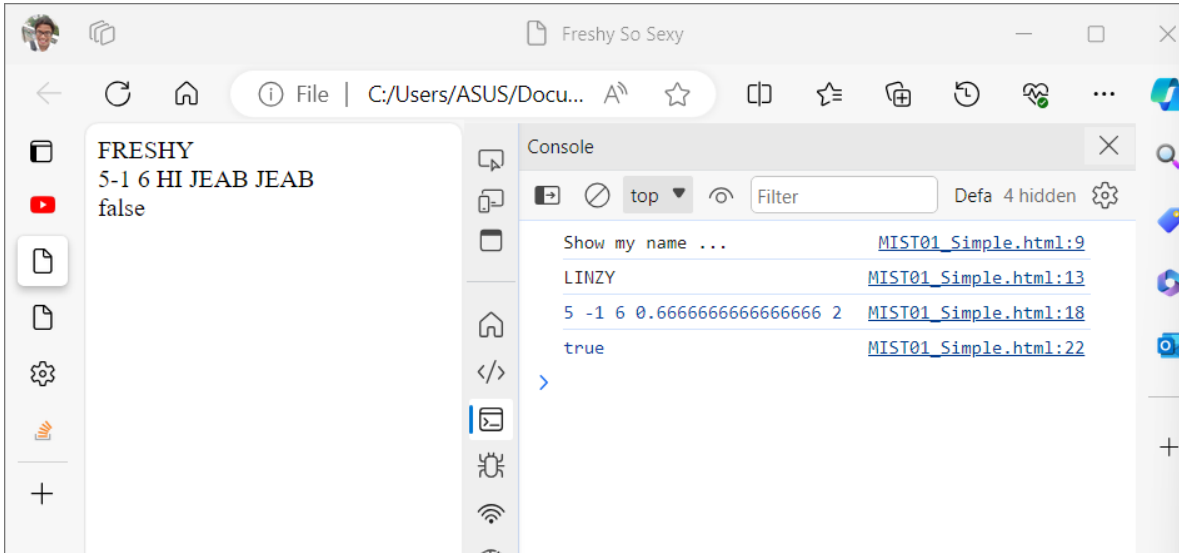
Geospatial Programming

Modern Integrated Surveying Technologies 2024

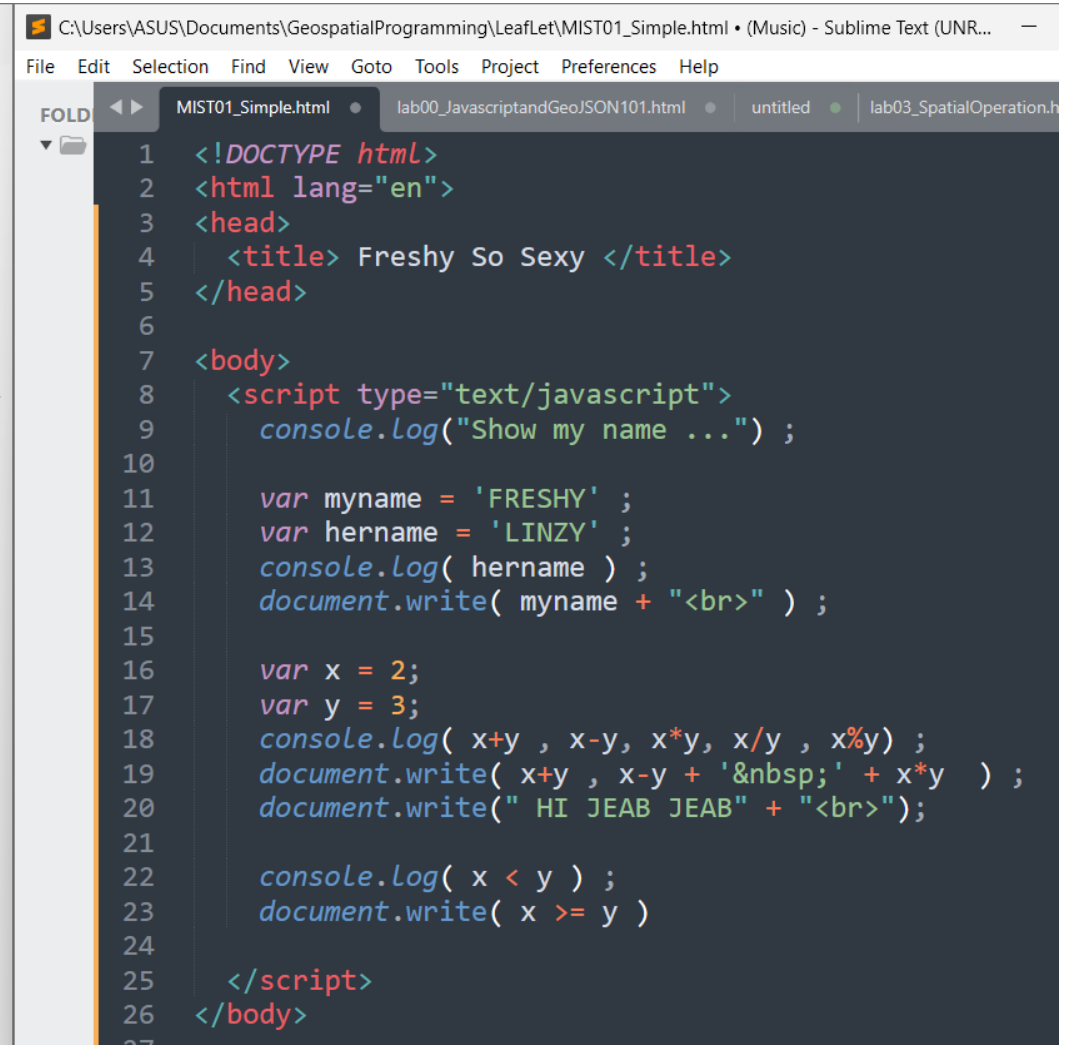
Thepchai Srinoi

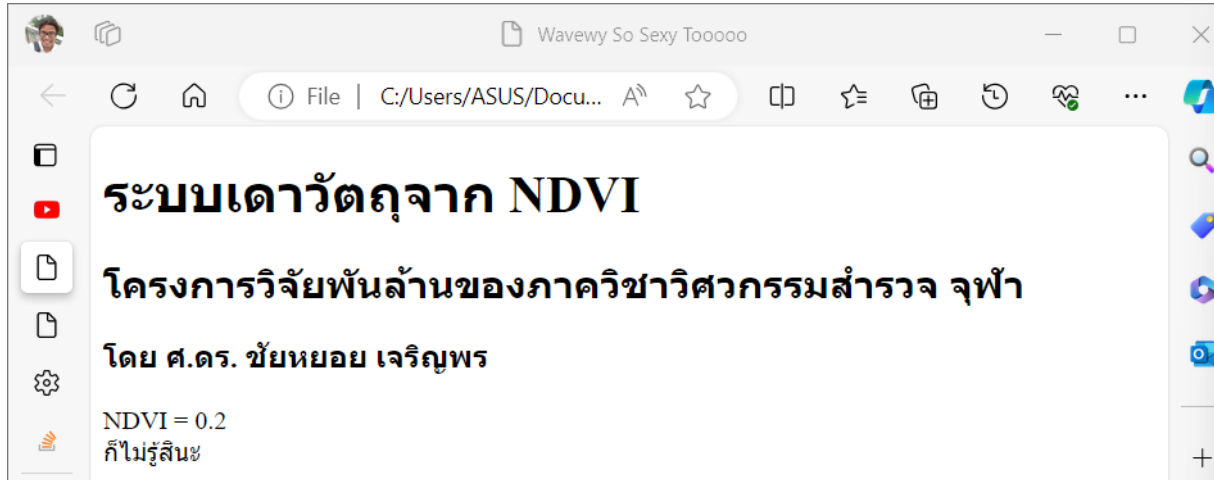
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Department of Survey Engineering Chulalongkorn University

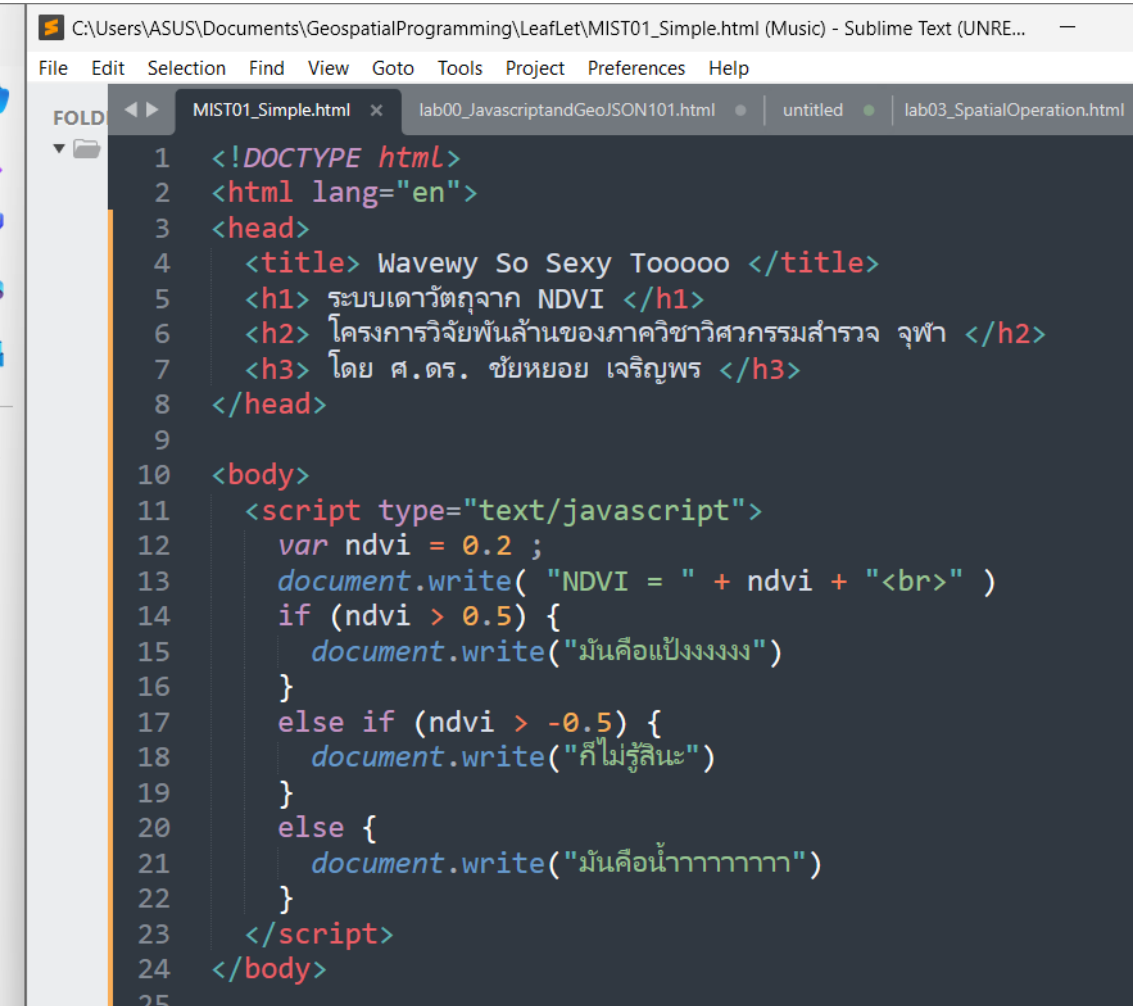


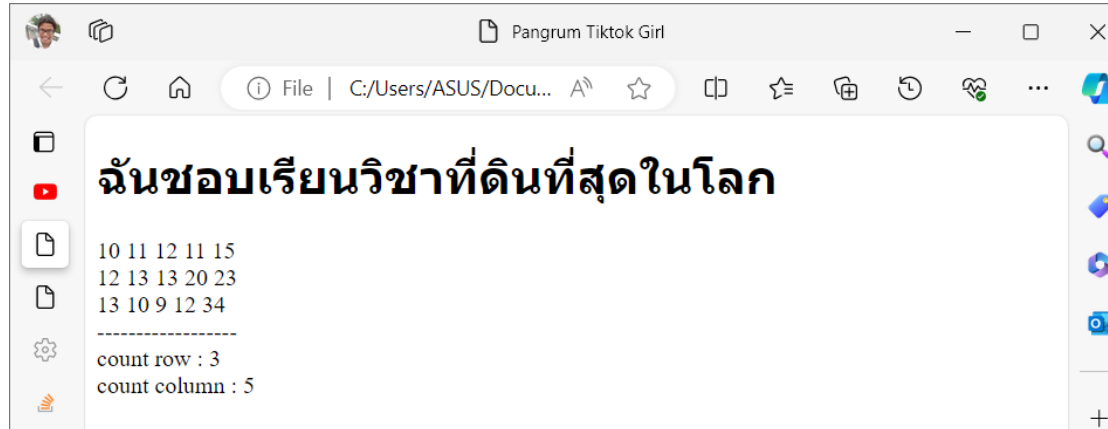
- การตั้งชื่อตัวแปร นำหน้าด้วย var ;
- การแสดงผลค่าในตัวแปร ใช้คำสั่ง console.log(...) หรือ document.write(...) แสดงขึ้นเว็บ;
- การดำเนินการทางคณิตศาสตร์ + - * / %
- การเปรียบเทียบ == != > < >= <=
- ตัวดำเนินการตรรกะ && (and) || (or) ! (not)





```
if (เงื่อนไข 1) {  
    ทำตามคำสั่ง เมื่อตรงเงื่อนไข 1  
}  
else if (เงื่อนไข 2) {  
    ทำตามคำสั่ง เมื่อตรงเงื่อนไข 2  
}  
else {  
    ทำตามคำสั่ง เมื่อตรงเงื่อนไขนอกเหนือก่อนหน้า  
}
```



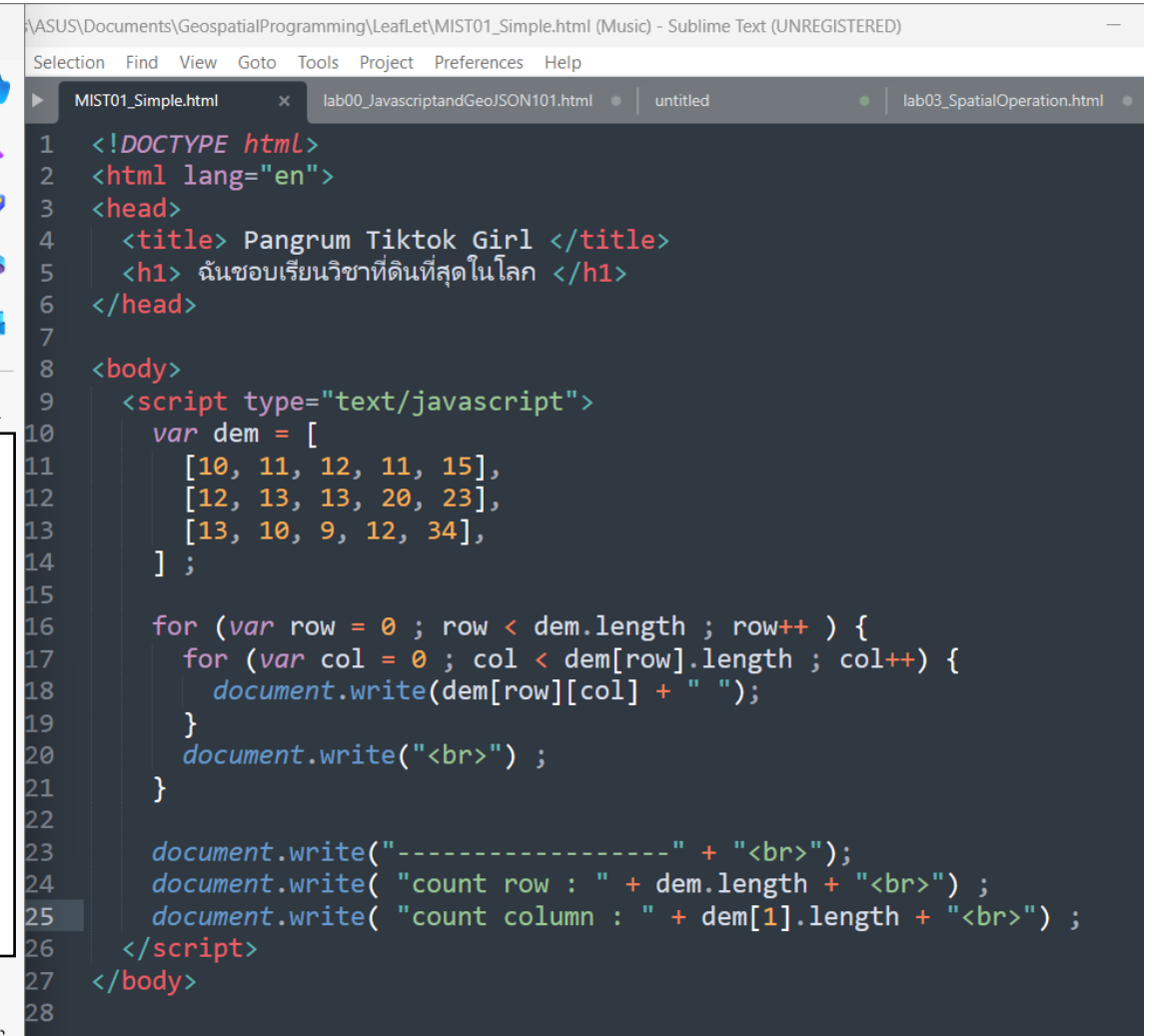


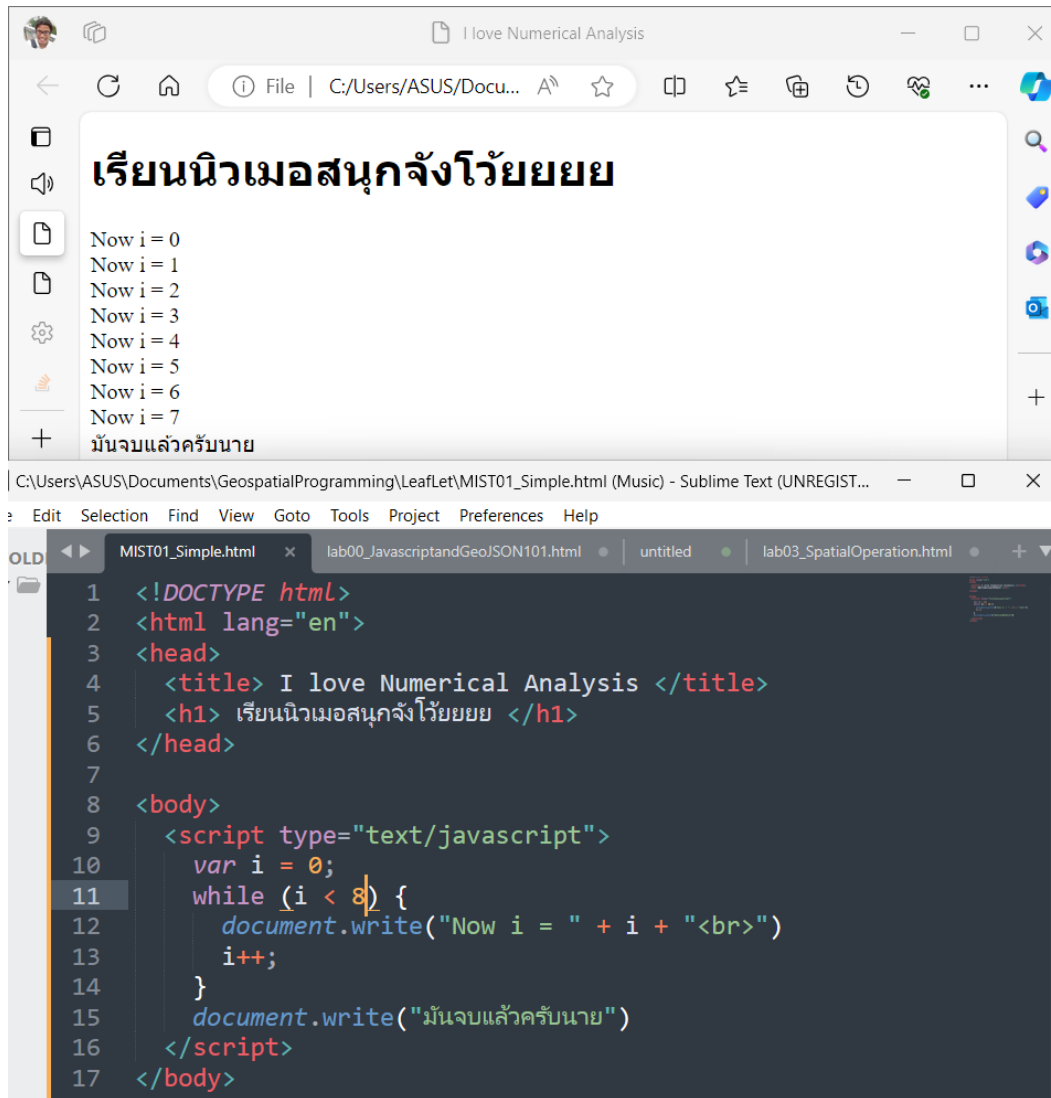
for (ตัวแปรลูป = ค่าเริ่มต้น ; เงื่อนไขลูปจนจบ ; การเปลี่ยนค่าตัวแปรลูป) {
 คำสั่งดำเนินการ ...
}

การเปลี่ยนค่าตัวแปรลูป

a++ หมายถึง a += 1 ซึ่งคือ a = a+1

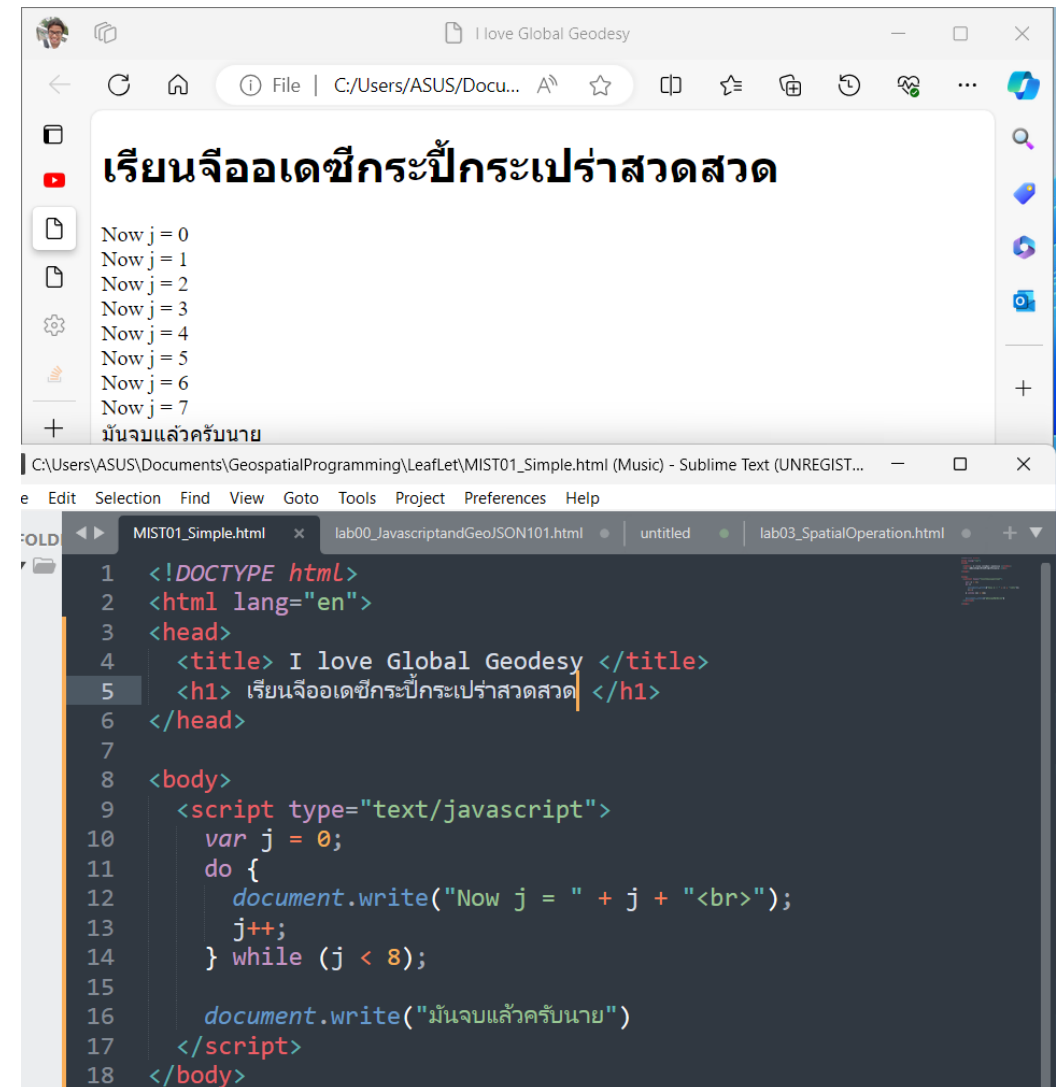
a-- หมายถึง a -= 1 ซึ่งคือ a = a-1





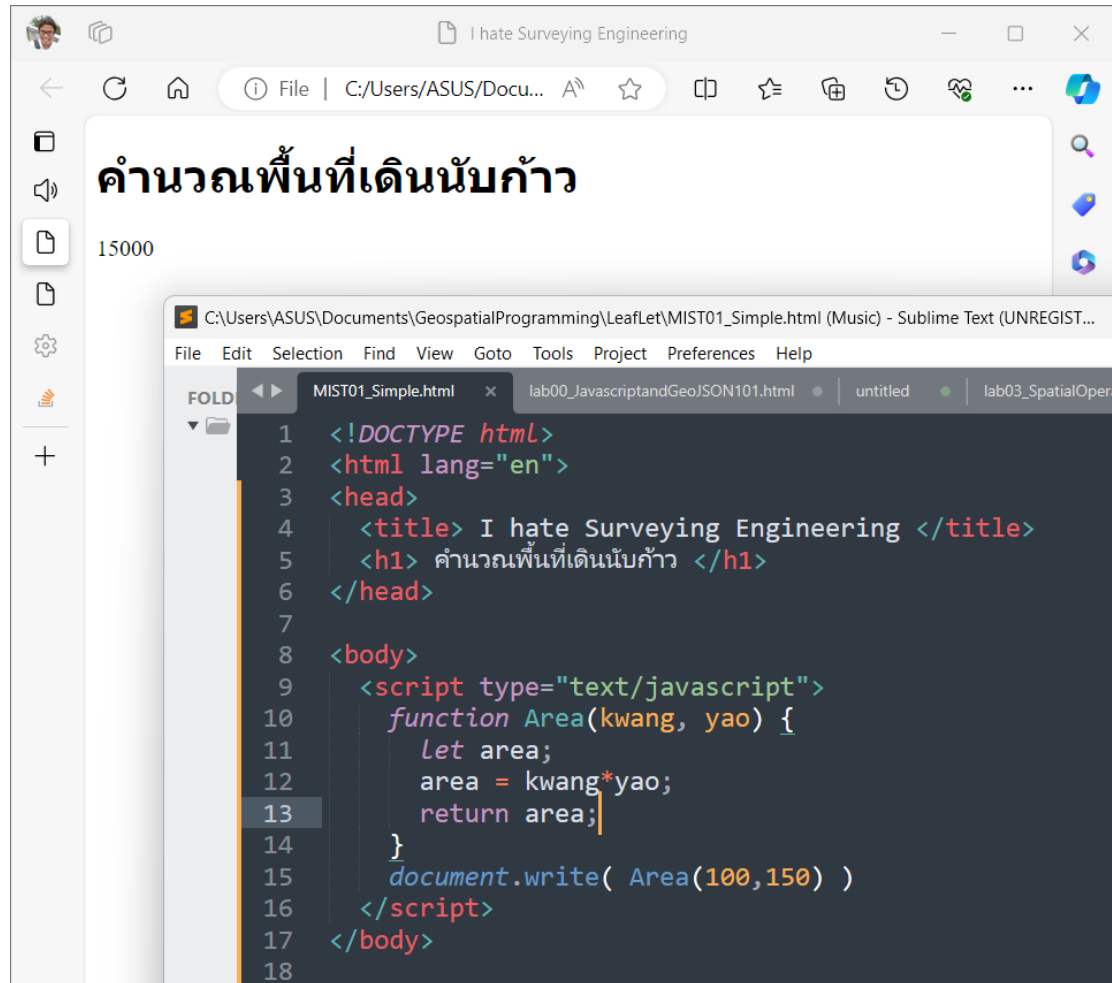
The screenshot shows a web browser window with the title "I love Numerical Analysis" and a Thai title "เรียนนิวเมอสนุกจ้งไวยยย". Below the title, a list of values for 'i' from 0 to 7 is displayed, followed by the Thai text "มันจบแล้วครับนาย". The code editor below shows the HTML and JavaScript code for this page. The JavaScript code uses a while loop to write the values of 'i' to the document.

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title> I love Numerical Analysis </title>
  <h1> เรียนนิวเมอสนุกจ้งไวยยย </h1>
</head>
<body>
  <script type="text/javascript">
    var i = 0;
    while (i < 8) {
      document.write("Now i = " + i + "<br>");
      i++;
    }
    document.write("มันจบแล้วครับนาย")
  </script>
</body>
```



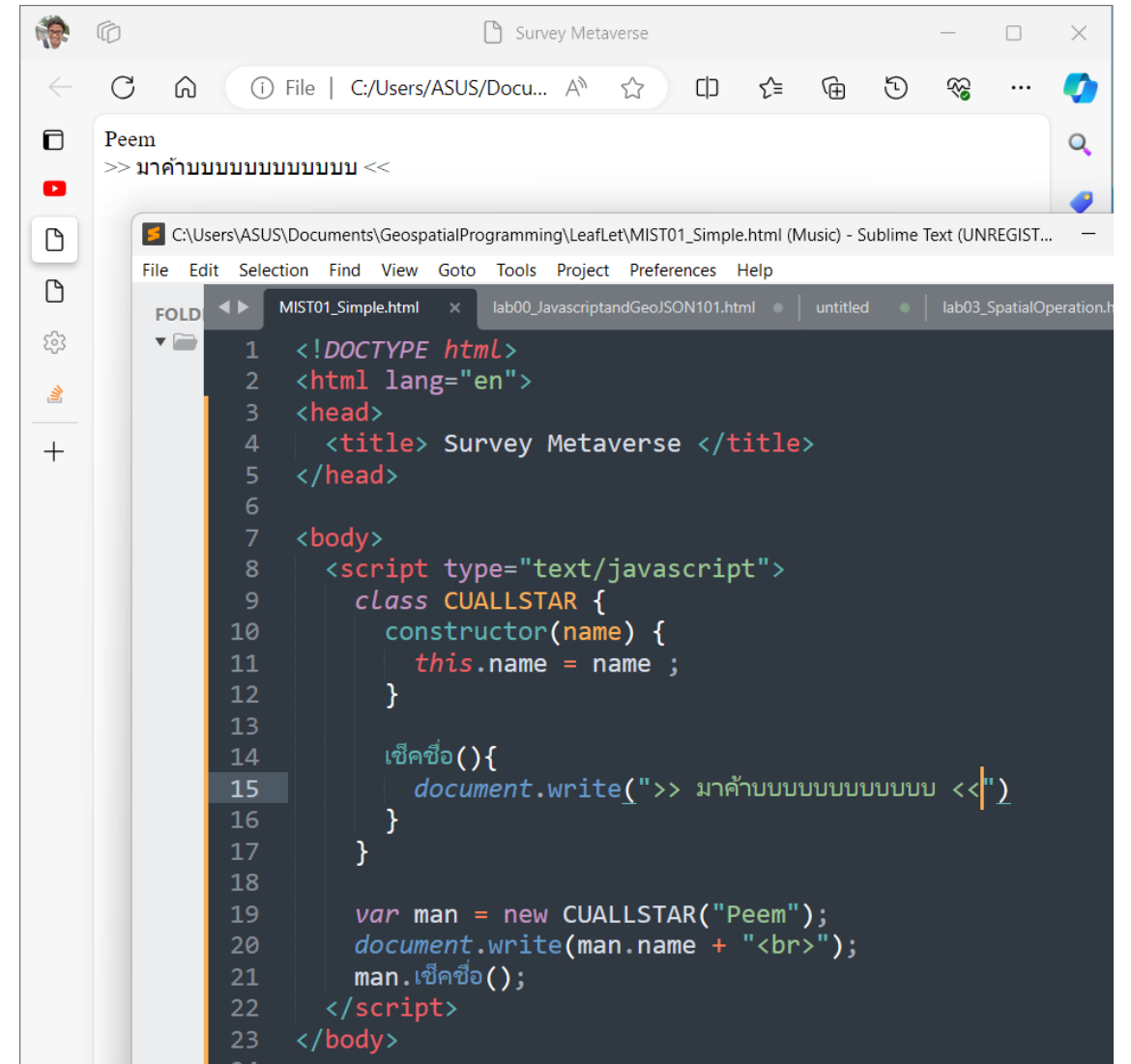
The screenshot shows a web browser window with the title "I love Global Geodesy" and a Thai title "เรียนจีออเดซีกระป๋องเปร่าสวดสวด". Below the title, a list of values for 'j' from 0 to 7 is displayed, followed by the Thai text "มันจบแล้วครับนาย". The code editor below shows the HTML and JavaScript code for this page. The JavaScript code uses a while loop to write the values of 'j' to the document.

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title> I love Global Geodesy </title>
  <h1> เรียนจีออเดซีกระป๋องเปร่าสวดสวด </h1>
</head>
<body>
  <script type="text/javascript">
    var j = 0;
    do {
      document.write("Now j = " + j + "<br>");
      j++;
    } while (j < 8);
    document.write("มันจบแล้วครับนาย")
  </script>
</body>
```

The screenshot shows a web browser window with the title "I hate Surveying Engineering" and a main heading "คำนวณพื้นที่เดินน้กก้าว" (Calculate the area for walking). Below the heading, the number "15000" is displayed. The browser's address bar shows the file path: C:\Users\ASUS\Documents\GeospatialProgramming\LeafLet\MIST01_Simple.html. Below the browser window, a Sublime Text editor window is open, displaying the source code of the HTML file. The code includes a title, a heading, and a JavaScript function named "Area" that calculates the area based on two parameters, "kwang" and "yao". The function is called with "Area(100,150)" and the result is written to the document.

```
1 <!DOCTYPE html>
2 <html lang="en">
3 <head>
4   <title> I hate Surveying Engineering </title>
5   <h1> คำนวณพื้นที่เดินน้กก้าว </h1>
6 </head>
7
8 <body>
9   <script type="text/javascript">
10     function Area(kwang, yao) {
11       let area;
12       area = kwang*yao;
13       return area;
14     }
15     document.write( Area(100,150) )
16   </script>
17 </body>
18
```



The screenshot shows a Sublime Text editor window with the title "Survey Metaverse". The code includes a title, a heading, and a JavaScript class named "CUALLSTAR". The class has a constructor function that takes a name parameter and sets "this.name" to the name. It also has a method named "เช็คชื่อ()" (Check name) that writes the name to the document. The class is instantiated with "new CUALLSTAR('Peem')", and the name is written to the document using "document.write(man.name + '
')".

```
1 <!DOCTYPE html>
2 <html lang="en">
3 <head>
4   <title> Survey Metaverse </title>
5 </head>
6
7 <body>
8   <script type="text/javascript">
9     class CUALLSTAR {
10       constructor(name) {
11         this.name = name ;
12       }
13
14       เช็คชื่อ(){
15         document.write(">> มาคำนวณพื้นที่เดินน้กก้าว <|")
16       }
17     }
18
19     var man = new CUALLSTAR("Peem");
20     document.write(man.name + "<br>");
21     man.เช็คชื่อ();
22   </script>
23 </body>
24
```

GeoJSON is a format for encoding a variety of geographic data structures.

```
var df = {
  "type": "FeatureCollection",
  "name": "hospital",
  "crs": { "type": "name", "properties": { "name": "urn:ogc:def:crs:OGC:1.3:CRS84" } },
  "features": [
    { "type": "Feature", "properties": { "AREA": 0.0, "PERIMETER": 0.0, "PLACES_": 1349, "PLACES_ID": 1349, "PLACE_ID": 0,
      "PL_TYPE": 23, "PL_NAME_E": "Tron Hospital", "PL_NAME_T": "ต.รอน" }, "geometry": { "type": "Point", "
      coordinates": [ 100.141144656353475, 17.446184746008033 ] } },
    { "type": "Feature", "properties": { "AREA": 0.0, "PERIMETER": 0.0, "PLACES_": 1350, "PLACES_ID": 1350, "PLACE_ID": 0,
      "PL_TYPE": 23, "PL_NAME_E": "Tha Pla Hospital", "PL_NAME_T": "ต.ท่าปลา" }, "geometry": { "type": "Point",
      "coordinates": [ 100.375906852463331, 17.795520932056949 ] } },
    { "type": "Feature", "properties": { "AREA": 0.0, "PERIMETER": 0.0, "PLACES_": 1351, "PLACES_ID": 1351, "PLACE_ID": 0,
      "PL_TYPE": 23, "PL_NAME_E": "Nam Pad Hospital", "PL_NAME_T": "ต.นาบด" }, "geometry": { "type": "Point", "
      coordinates": [ 100.677952650657588, 17.727086818963244 ] } }
  ]
}
```

GeoJSON supports the following geometry types: *Point*, *LineString*, *Polygon*, *MultiPoint*, *MultiLineString*, and *MultiPolygon*. Geometric objects with additional properties are **Feature** objects.

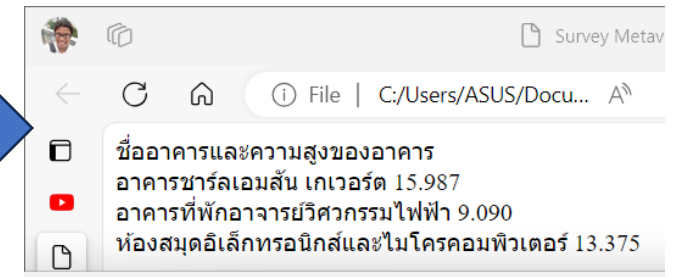
Sets of features are contained by **FeatureCollection** objects.

GeoJSON Operation : Example

```
var mypolygon = {
  "type": "FeatureCollection",
  "name": "Building",
  "crs": { "type": "name", "properties": { "name" : "urn:ogc:def:crs:OGC:1.3:CRS84" } },
  "features": [
    { "type": "Feature", "properties": { "fid": 9, "Name": "อาคารชาร์ลเอ็มสัน เกเวอร์ต", "h": 15.987461663515655}, "geometry": { "type": "MultiPolygon", "coordinates": [ [ [ [ 100.532399706, 13.736248581 ], [ 100.532019704, 13.736303882 ], [ 100.532041639, 13.736443883 ], [ 100.532422915, 13.736388575 ], [ 100.532399706, 13.736248581 ] ] ] ] } },
    { "type": "Feature", "properties": { "fid": 10, "Name": "อาคารที่พักอาจารย์วิศวกรรมไฟฟ้า", "h": 9.09 }, "geometry": { "type": "MultiPolygon", "coordinates": [ [ [ [ 100.532293299, 13.736247374 ], [ 100.532383682, 13.736233733 ], [ 100.532365687, 13.736111769 ], [ 100.532274026, 13.736124795 ], [ 100.532293299, 13.736247374 ] ] ] ] } },
    { "type": "Feature", "properties": { "fid": 11, "Name": "ห้องสมุดอิเล็กทรอนิกส์และไมโครคอมพิวเตอร์", "h": 13.375261663515653}, "geometry": { "type": "MultiPolygon", "coordinates": [ [ [ [ 100.532267892, 13.736259365 ], [ 100.532243961, 13.736106297 ], [ 100.532108361, 13.736122709 ], [ 100.532131034, 13.736278277 ], [ 100.532267892, 13.736259365 ] ] ] ] } },
  ]
}
```

```
document.write('ชื่ออาคารและความสูงของอาคาร' + "<br>")

df = mypolygon.features
for (var b in df) {
  document.write(df[b].properties.Name + ' ' +
    (df[b].properties.h).toFixed(3) + "<br>")
}
```



```
// Building Ellipsoidal Height
var report = mypolygon.features.map( (item) => {
  let bname = item.properties.Name;
  let hae = item.properties.h;
  return { name : bname, HAE : parseInt(hae)};
});

console.log(report)
```

```
(3) [{...}, {...}, {...}] i
▶ 0: {name: 'อาคารชาร์ลเอ็มสัน เกเวอร์ต', HAE: 15}
▶ 1: {name: 'อาคารที่พักอาจารย์วิศวกรรมไฟฟ้า', HAE: 9}
▶ 2: {name: 'ห้องสมุดอิเล็กทรอนิกส์และไมโครคอมพิวเตอร์', HAE: 13}
length: 3
▶ [[Prototype]]: Array(0)
```

```
var bd = mypolygon.features.filter( (item) => {
  return item.properties.h > 10
});

console.log( bd )
```

```
MIST01_Simple.html:31
▼ (2) [{...}, {...}] i
▼ 0:
  ▶ geometry: {type: 'MultiPolygon', coordinates: Array(1)}
  ▶ properties: {fid: 9, Name: 'อาคารชาร์ลเอ็มสัน เกเวอร์ต', h: 15.987461663515655}
  ▶ type: "Feature"
  ▶ [[Prototype]]: Object
▼ 1:
  ▶ geometry: {type: 'MultiPolygon', coordinates: Array(1)}
  ▶ properties: {fid: 11, Name: 'ห้องสมุดอิเล็กทรอนิกส์และไมโครคอมพิวเตอร์', h: 13.375261663}
  ▶ type: "Feature"
  ▶ [[Prototype]]: Object
length: 2
▶ [[Prototype]]: Array(0)
```

```
var bdSUM = bd.reduce( (sum,item) => {
  return sum + item.properties.h
},0);

console.log(bdSUM)
```

29.362723327031308


```
// Show map at Chula Engineering
const map = L.map('map').setView([13.7365, 100.532], 17);
// Base Map
const googleSat = L.tileLayer('http://{s}.google.com/vt/
  lyrs=s&x={x}&y={y}&z={z}',{
    maxZoom: 20,
    subdomains:['mt0','mt1','mt2','mt3']
  }).addTo(map);

// Layer Visualization
L.geoJSON( eng, {
  style: function (feature) {
    return {color: "green"};
  },
} ).addTo(map)

// Layer Visualization
L.geoJSON( mypolygon, {
  style: function (feature) {
    return {color: "red"};
  },
  onEachFeature: function (feature,layer) {
    layer.bindPopup(feature.properties.Name)
  }
} ).addTo(map)

L.geoJSON( road_area, {
  style: function (feature) {
    return {color: "blue"};
  },
} ).addTo(map)

L.geoJSON( result, {
  style: function (feature) {
    return {color: "yellow"};
  },
} ).addTo(map)
```

GeospatialProg

File | C:/Users/ASUS/Documents/GeospatialProgramming/Leaflet/lab03_SpatialOperatio

Baka University : Vidya Vidva Friend Forever

Geospatial Programming with GeoJSON, Leaflet.js and Turf.js



---- ขอแสดงความเสียใจด้วย รายชื่ออาคารที่ ถนนหมื่นน้อย ตัดผ่าน ----

- 1 อาคารวิศวะ 100 ปี ทุบทิ้ง = 1569.86 m2
- 2 อาคารวิศวกรรมศาสตร์ 2 ทุบทิ้ง = 1196.30 m2
- 3 อาคารวิศวกรรมศาสตร์ 1 ทุบทิ้ง = 1216.96 m2
- 4 อาคารนฤมิต บิดเทสสันต์ ทุบทิ้ง = 534.44 m2
- 5 อาคารชีววิทยาและเคมี 2 ทุบทิ้ง = 4847.63 m2

```
var mypolygon = {
  "type": "FeatureCollection",
  "name": "cuSciEng_Building",
  "crs": { "type": "name", "properties": { "name": "urn:ogc:def:crs:OGC:1.3:CRS84" } },
  "features": [
    { "type": "Feature", "properties": { "fid": 1, "Name": "อาคารวิศวกรรมศาสตร์ 3", "h": 31.337 }, "geometry": { "type": "MultiPolygon", "coordinates": [
      [ [ [ 100.532269405, 13.737039278 ], [ 100.532313651, 13.737312083 ], [
        100.532863632, 13.737228819 ], [ 100.532865421, 13.737252762 ], [ 100.
        533020451, 13.737227845 ], [ 100.532979564, 13.736969392 ], [ 100.
        533338587, 13.736912864 ], [ 100.53337784, 13.737171328 ], [ 100.
        533532869, 13.73714641 ], [ 100.5335327
        534005948, 13.737044458 ], [ 100.533968
      ] ] ] ]
    }
  ]
};

var road = {
  "type": "FeatureCollection",
  "name": "Santitamnont Rd.",
  "features": [
    {
      "type": "Feature",
      "properties": {
        'fid': 1,
        'name': 'Phisan Rd.'
      },
      "geometry": {
        "coordinates": [
          [
            100.53441983039465,
            13.736316000119672
          ],
          [
            100.53441983039465,
            13.736316000119672
          ]
        ]
      }
    }
  ]
};

var road_area = turf.buffer( road , 10 , {units:"meters"} )

var k = 0;
document.write('---- ขอแสดงความเสียใจด้วย รายชื่ออาคารที่ ถนนหมื่นน้อย ตัดผ่าน ---- <br>');

for (var i = 0; i < mypolygon.features.length; i++) {
  var mypolygon_now = mypolygon.features[i]
  var mycentroid_now = turf.centroid( mypolygon_now)
  mycentroid_now.properties.h = mypolygon_now.properties.h
  resultt.features.push( mycentroid_now )
  var x = turf.intersect( mypolygon_now,
    road_area.features[0] )

  console.Log(x)

  if (x == null) {
    // ช่างแม่งมัน ช่างแม่งมันนานนน ..... อ อ
  }
  else {
    document.write(k+1,' ',mypolygon_now.properties.Name, ' ', 'ทุบทิ้ง = ',
      ' ', (turf.area(mypolygon_now)).toFixed(2), ' ', 'm2' + '<br>')
    resultt.features.push(x)
    k++
  }
}
```

<https://developers.google.com/earth-engine/guides/getstarted>



... and upload your own vectors and rasters

> 200 public datasets

> 5 million images

> 4000 new images every day

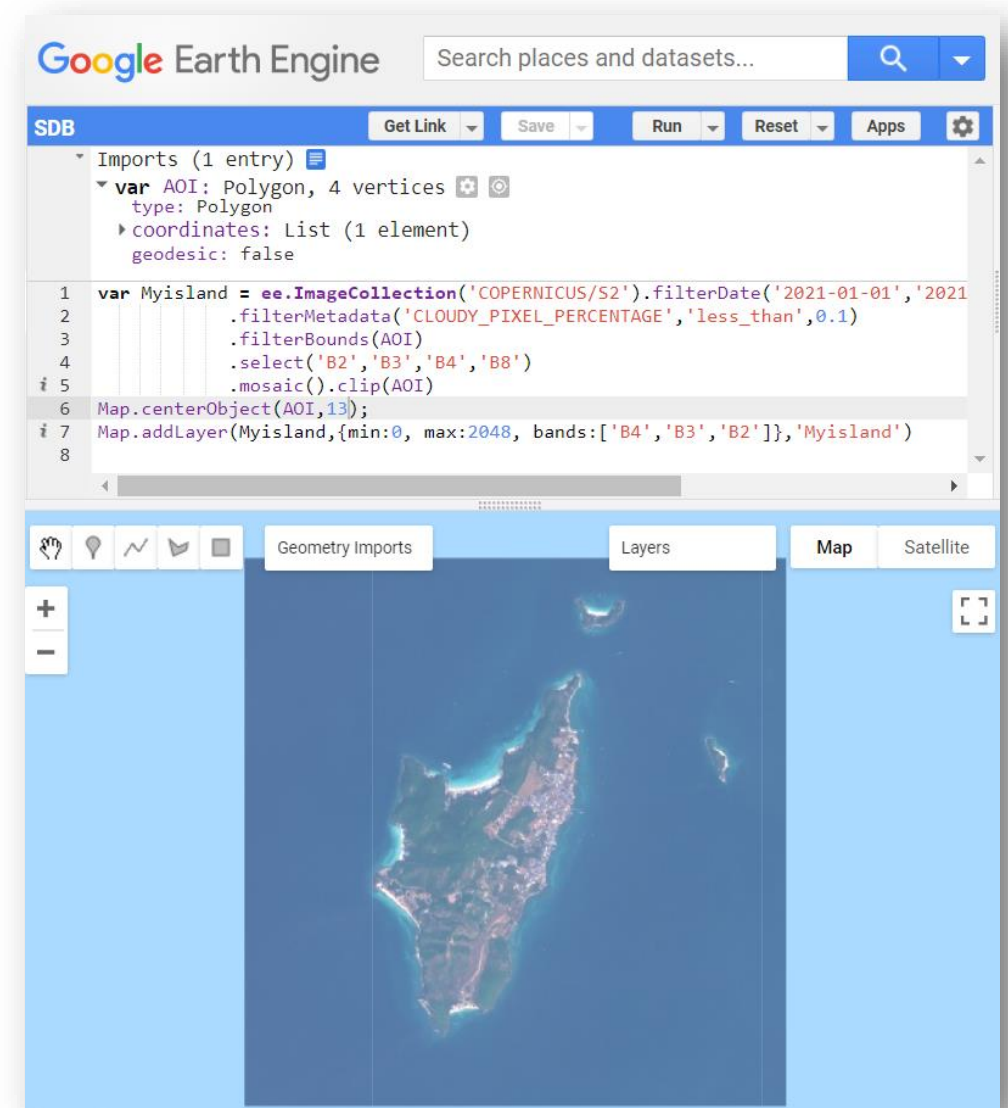
> 7 petabytes of data

Google Earth Engine with Java programming

<https://code.earthengine.google.com/>

สำหรับ python programming สามารถทำได้ผ่าน Google Colab

<https://colab.research.google.com/>



THE END

Geospatial Programming

Modern Integrated Surveying Technologies 2024

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