GEE遥感训练营出品

Google Earth Engine教学

基本概念II

Day 2

基本内容

- ✓Geometry
- ✓Dictionary
- ✓Feature
- ✓FeatureCollection

基 本 语 法

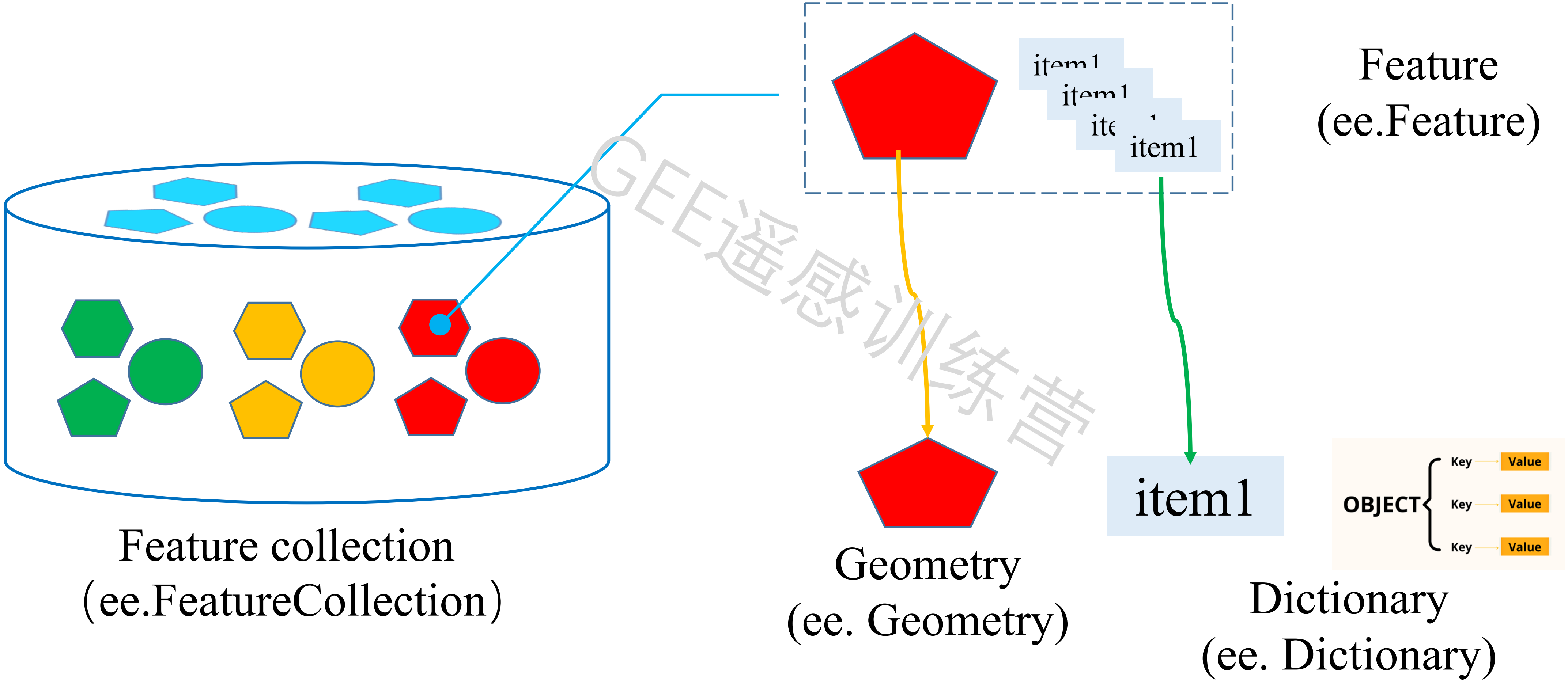
Javascript语法

```
➢ var demoStr = ‘Hello, GEE’;
➢ var number = 42;
➢ var demoList = [0, 1, 1, 2, 3, 5];
➢ var object = {
     ‘foo’: 'bar',
     baz: 13,
     stuff: ['this', 'that', 'the other thing']
   };
➢ var reflect = function(element) {
       return element;
   };
➢ print('Hello World!')
```

GEE语法

```
➢ var demoStr =ee.String( ‘Hello, GEE’);
➢ var demoNum=ee.Number(42);
➢ var demoList = ee.List([0,1,2,3]);
➢ var demoDictionary = ee.Dictionary({
     e: Math.E,
     pi: Math.PI,
     phi: (1 + Math.sqrt(5)) / 2
   });
➢ function reflect (element) {
   return element;
}
```

Geometry, Dictionary, Feature和FeatureCollection之间的关系



Feature
(ee.Feature)

Feature collection
(ee.FeatureCollection)

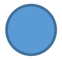
Geometry
(ee. Geometry)

Dictionary
(ee. Dictionary)

Geometry

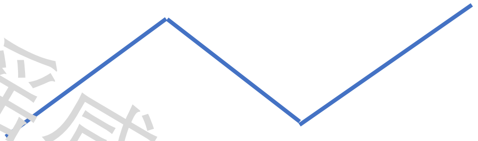
- Point

ee.Geometry.Point(lng, lat)



- LineString

e.g. ee.Geometry.LineString (aLng, aLat, bLng, bLat, ...)

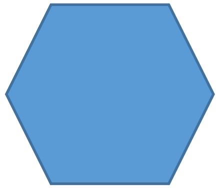


- Rectangle

ee.Geometry.Rectangle (minLng, minLat, maxLng, maxLat)

- Polygon

ee.Geometry.Polygon (aLng, aLat, bLng, bLat, ..., aLng, aLat)



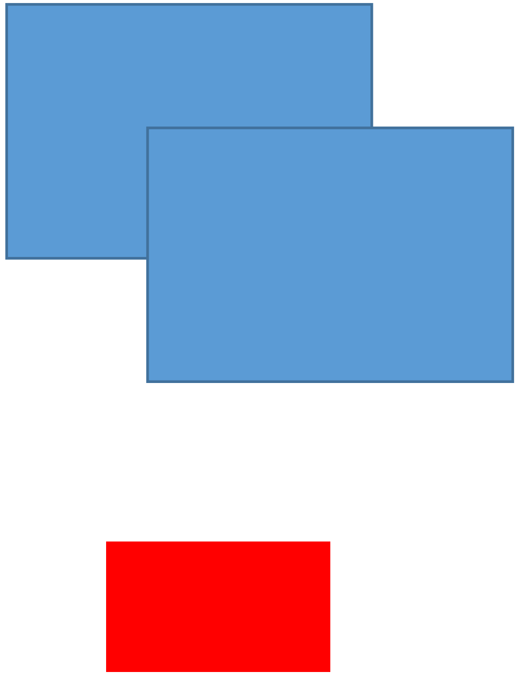
- MultiPoint

ee.Geometry.MultiPoint(aLng, aLat, bLng, bLat, ...)

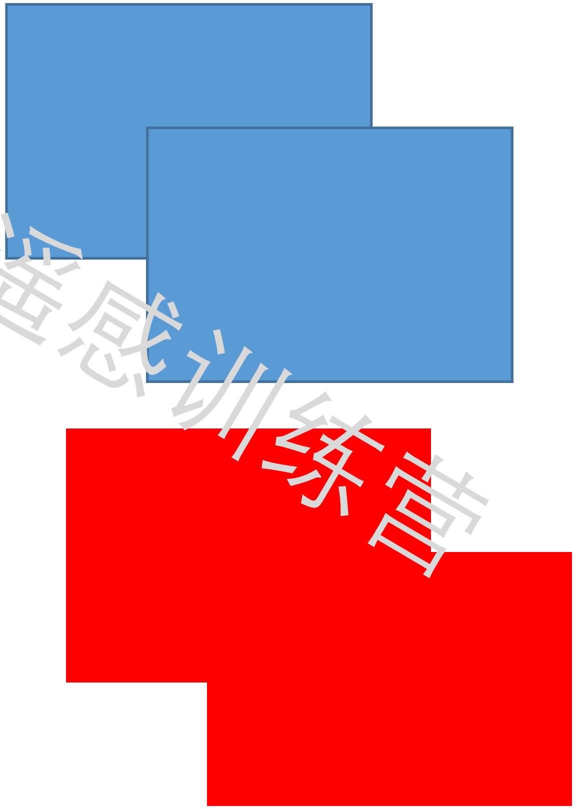
https://code.earthengine.google.com/14ffcce8c2a5b6ee42001a78a43861e8

Geometry拓扑运算

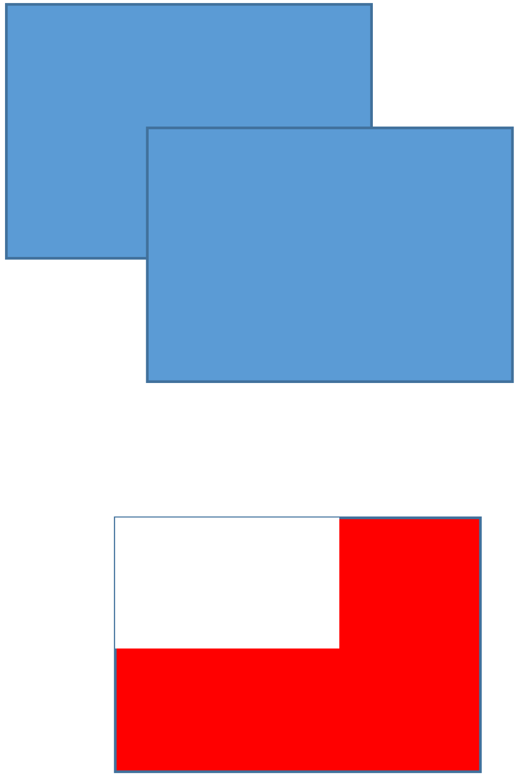
- Intersection



- Union



- Difference



https://code.earthengine.google.com/a4a27f97f8a3cc3747524f940f578c7a

Note:是用Geometry进行拓扑运算，而不能用FeatureCollection等进行运算

Geometry—常用函数

area

Returns the area of the geometry.

size

buffer

Returns the input buffered by a given distance. If the distance is positive, the geometry is expanded, and if the distance is negative, the geometry is contracted.

bounds

Returns the bounding rectangle of the geometry

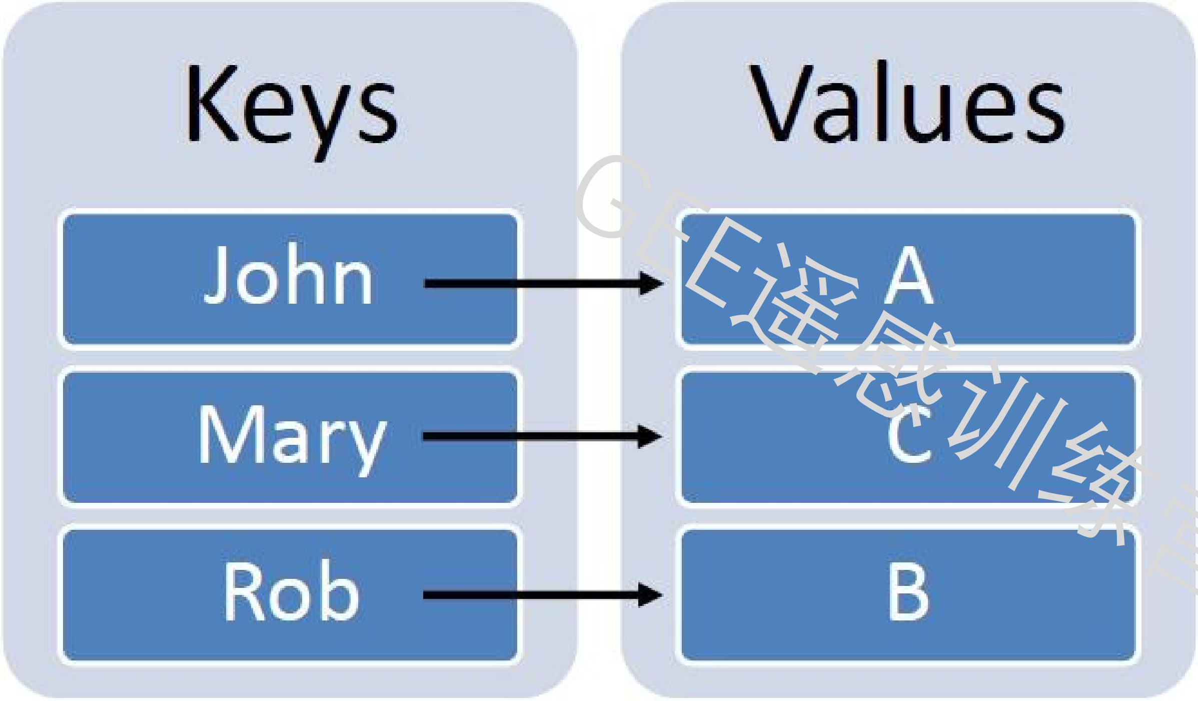
https://code.earthengine.google.com/5fb4420242d372b8da432a13819d607b

Dictionary

- To create a Dictionary, provide an key-value pair

重点是理解Dictionary的使用

使用Dictionary计算JM距离判断样本可分性



```
// Make a Dictionary on the server.
var dictionary = ee.Dictionary({
  e: Math.E,
  pi: Math.PI,
  phi: (1 + Math.sqrt(5)) / 2
});
// Get some values from the dictionary.
print('Euler:', dictionary.get('e'));
print('Pi:', dictionary.get('pi'));
print('Golden ratio:', dictionary.get('phi'));
// Get all the keys:
print('Keys: ', dictionary.keys());
```

https://code.earthengine.google.com/b824c3742669ef9eba4414dc447d3b17

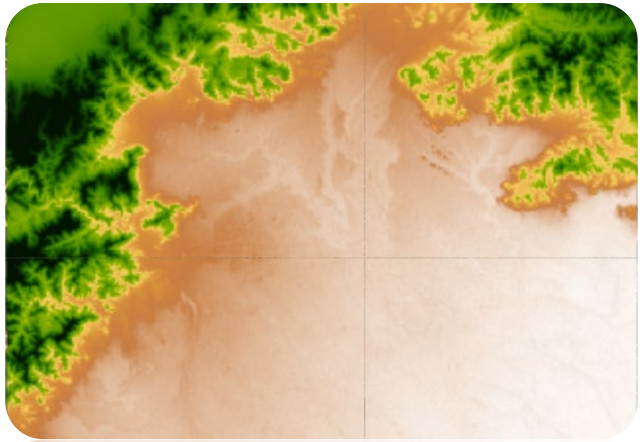
Image之归一化

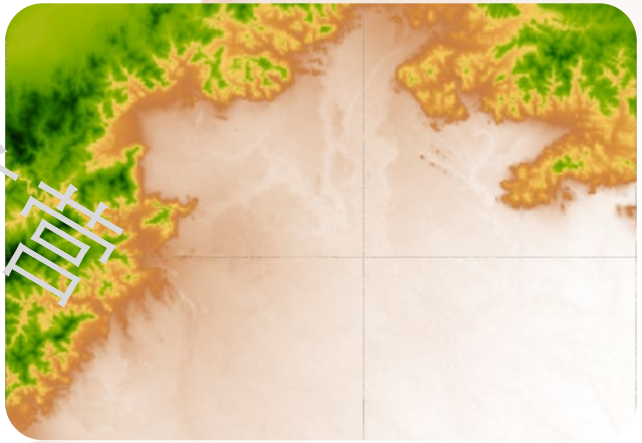
unitScale

Scales the input so that the range of input values [low, high] becomes [0, 1]. Values outside the range are NOT clamped. This algorithm always produces floating point pixels.

where

For each pixel in each band of 'input', if the corresponding pixel in 'test' is nonzero, output the corresponding pixel in value, otherwise output the input pixel.





https://code.earthengine.google.com/87108ce069098ac6b333ea9cc194edb6

Feature

- To create a Feature, **provide the constructor with a Geometry** and (optionally) a dictionary of other properties. Specifically, a Feature is an object with a geometry property storing a Geometry object (or null) and a properties property storing a dictionary of other properties.

```
// Create an ee.Geometry.
var polygon =  ee.Geometry.Polygon(
        [[[-115.151171875, 41.8243015216869/],
          [-115.151171875, 37.77479462232299],
          [-108.2078125, 37.77479462232299],
          [-108.2078125, 41.8243015216869/]]]);

// Create a Feature from the Geometry.
var polyFeature = ee.Feature(polygon, {name: "plg1", areas: polygon.area()});
print(polyFeature);
```

可以使用Feature来导出一些有用的东西，比如混淆矩阵

https://code.earthengine.google.com/47a326a465e1af4319589c40f25fedd5

Note: 由于Feature在构建过程中是带地理坐标的，所以可以用Map等显示

FeatureCollection

- **方式1—自己创建**

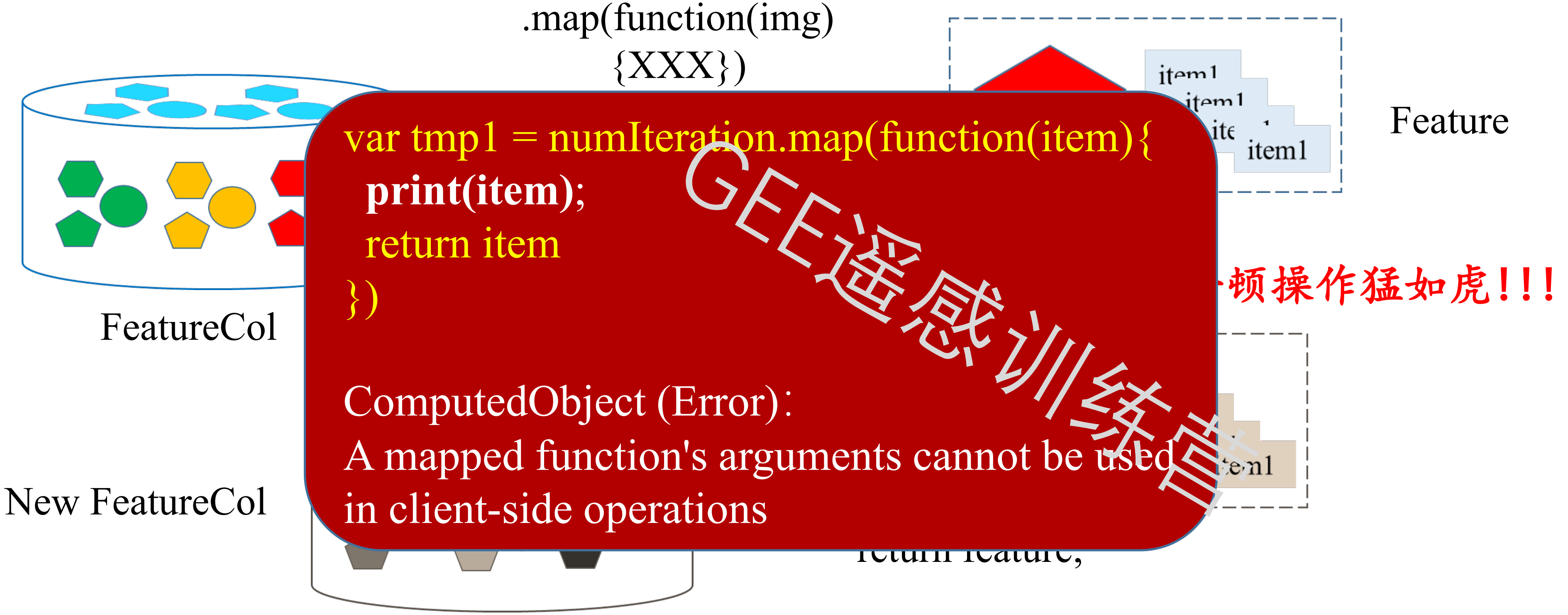
```
// Create a FeatureCollection from the list and print it.
var fromList = ee.FeatureCollection(featureList);
```

- **方式2—从Assets导入**

https://code.earthengine.google.com/6d398d6974c87e17cb3ea98993c1a3d5

FeatureCollection—map功能

To apply a function to **every feature** in an FeatureCollection use FeatureCollection.map(). The only argument to map() is **a function** which **takes one parameter**: an ee.Feature



```
var tmp1 = numIteration.map(function(item){
  print(item);
  return item
})
```

ComputedObject (Error):
A mapped function's arguments cannot be used in client-side operations

Note: print, Map.addLayer等属于本地函数，最好不要出现在GEE等服务器代码里

FeatureCollection基本操作

- **计算大小size**

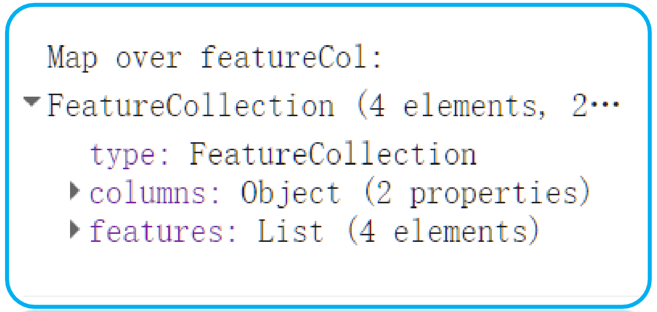
```
// compute the size
var featureColSize = fromList.size();
print("featureColSize:",featureColSize);
```

- **通过map函数对赋值属性**

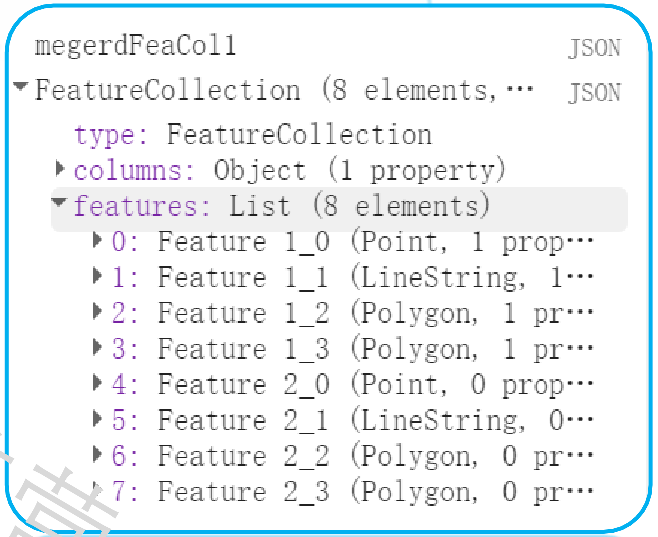
```
// map over featureCollection and set properties
var newFeaCol = fromList.map(function(item){
  return item.set("landcover", 1);
});
print("Map over featureCol:", newFeaCol);
```

- **合并不同的FeatureCollection**

```
// merge featureCollection
var megerdFeaCol1 = newFeaCol.merge(fromList);
```



```
Map over featureCol:
▾FeatureCollection (4 elements, 2…
   type: FeatureCollection
  ▸columns: Object (2 properties)
  ▸features: List (4 elements)
```

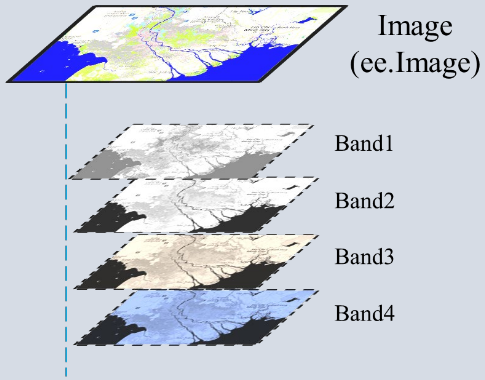


```
megerdFeaCol1                                JSON
▾FeatureCollection (8 elements, …            JSON
   type: FeatureCollection
  ▸columns: Object (1 property)
  ▾features: List (8 elements)
    ▸0: Feature 1_0 (Point, 1 prop…
    ▸1: Feature 1_1 (LineString, 1…
    ▸2: Feature 1_2 (Polygon, 1 pr…
    ▸3: Feature 1_3 (Polygon, 1 pr…
    ▸4: Feature 2_0 (Point, 0 prop…
    ▸5: Feature 2_1 (LineString, 0…
    ▸6: Feature 2_2 (Polygon, 0 pr…
    ▸7: Feature 2_3 (Polygon, 0 pr…
```

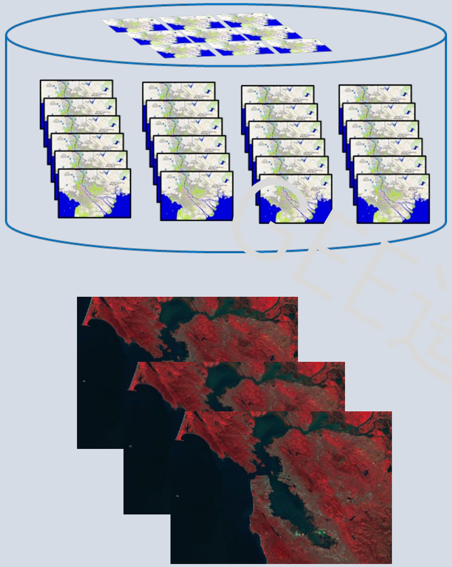
https://code.earthengine.google.com/c45925299edb1149761fcaf7ca86ba4d

Image，ImageCol, Feature, FeatureCol比较

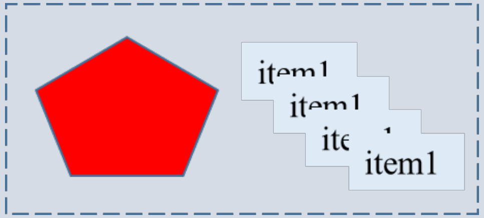
- Image

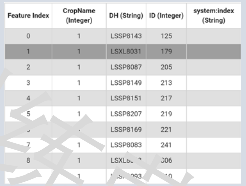


- ImageCol



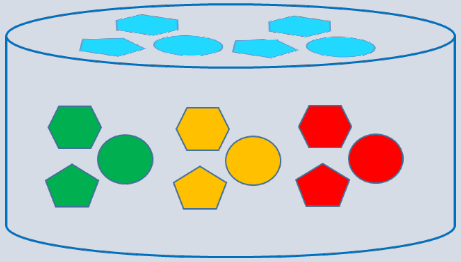
- Feature

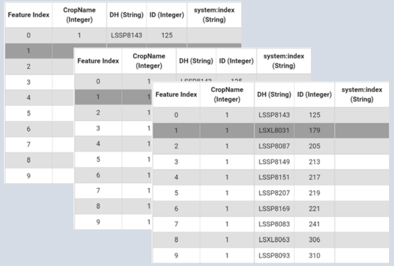




Feature Index	CropName (Integer)	DH (String)	ID (Integer)	system:index (String)
0	1	LSSP8143	125	
1	1	LSXL8031	179	
2	1	LSSP8087	205	
3	1	LSSP8149	213	
4	1	LSSP8151	217	
5	1	LSSP8207	219	
[illegible]	[illegible]	LSSP8169	221	
7	1	LSSP8083	241	
8	1	LSXL8[illegible]	[illegible]06	
[illegible]	1	[illegible]093	[illegible]	

- FeatureCol





Feature Index	CropName (Integer)	DH (String)	ID (Integer)	system:index (String)
0	1	LSSP8143	125	
1	1	LSXL8031	179	
2	1	LSSP8087	205	
3	1	LSSP8149	213	
4	1	LSSP8151	217	
5	1	LSSP8207	219	
6	1	LSSP8169	221	
7	1	LSSP8083	241	
8	1	LSXL8063	306	
9	1	LSSP8093	310	

```
Map.addLayer(img, {palette:[]}, “img”);
Map.addLayer(img. randomVisualizer, {}, “img”);
```

```
Map.addLayer(feature, {color:”red”}, “feature”);
Map.addLayer(feature.draw(“red), {color:”red”}, “feature”);
```

Thanks for your attention

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