

# **M.Tech Geoinformatics**

## **Geographic Information System (24CC03)**

### **Unit III: Data Representation**

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**Guest Faculty**

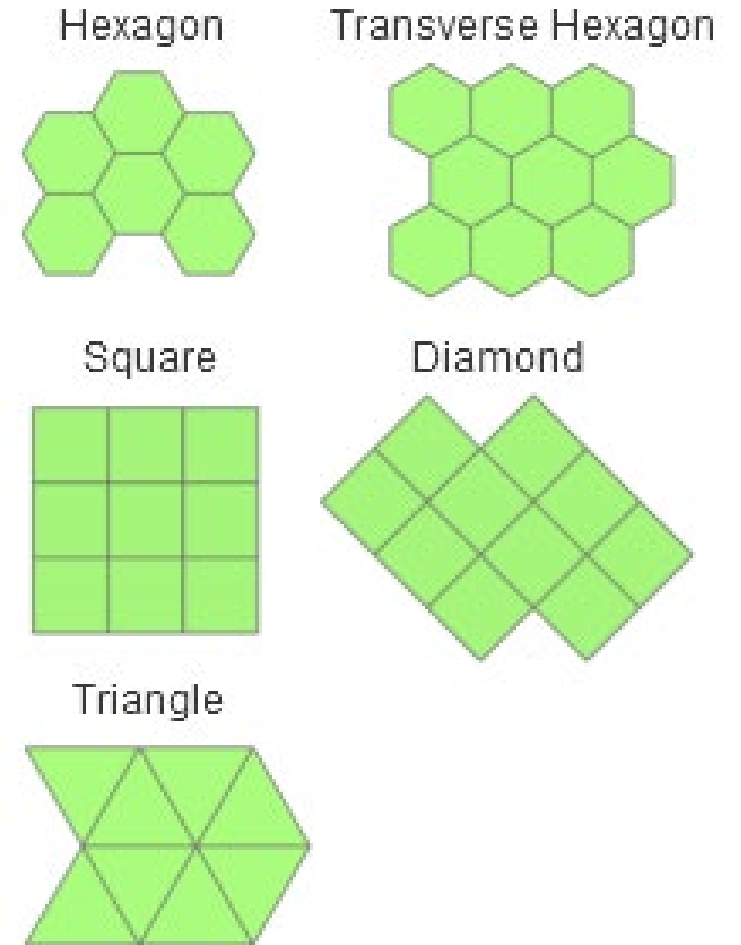
**Department of Geography**

**Bharathidasan University, Tiruchirappalli.**

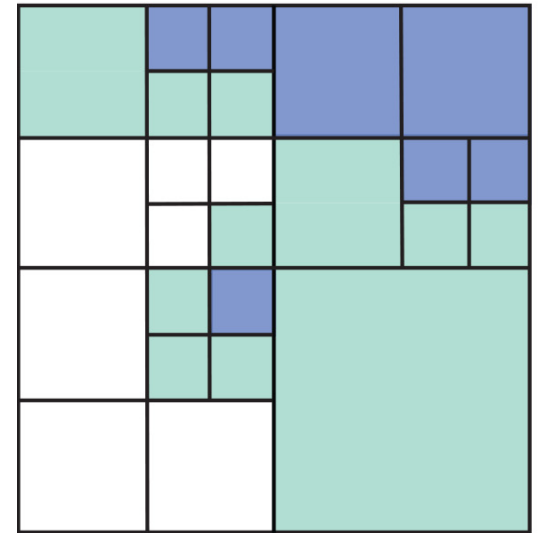
# **Data Representation**

# Tessellation

- The division of a two-dimensional area into polygonal tiles, or a three-dimensional area into polyhedral blocks, in such a way that no figures overlap and there are no gaps.
- There are regular and irregular tessellations

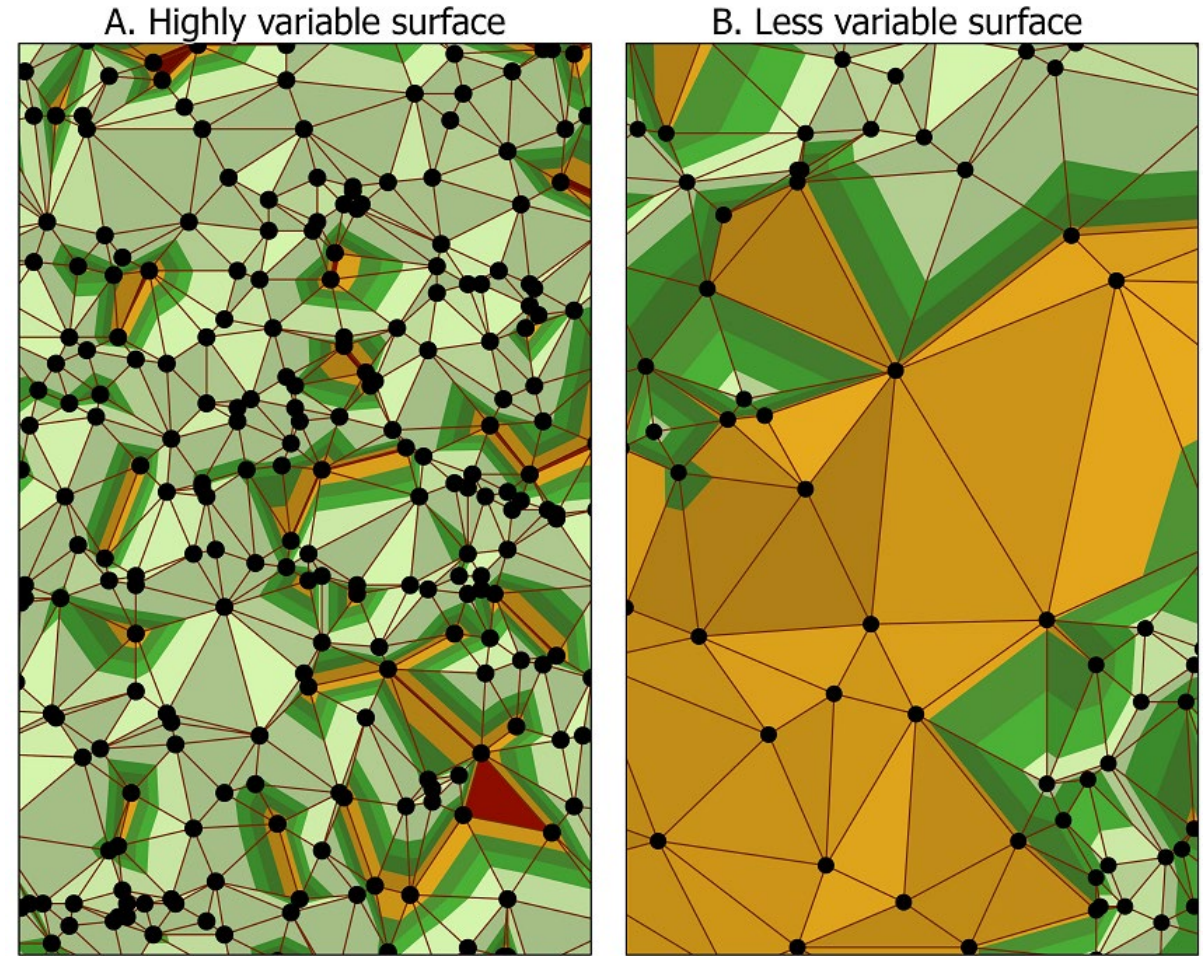


- In a regular tessellation, the cells have the same shape and size;
- a simple example of this is a rectangular raster of unit squares, represented in a computer.
- Irregular Tessellation are partitions of space into mutually distinct cells, but now the cells may vary in size and shape, allowing them to adapt to the spatial phenomena that they represent.



# TIN

- **Triangular Irregular Networks (TIN)** are a digital means to represent surface morphology.
- TINs are a form of **vector-based digital geographic data** and are constructed by triangulating a set of vertices (points).
- The vertices are connected with a series of edges to form a **network of triangles**.
- There are different methods of interpolation to form these triangles






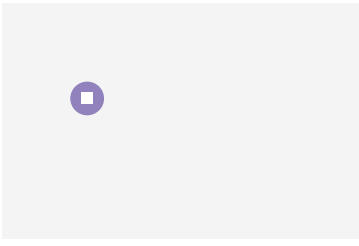
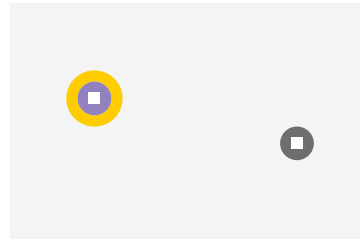



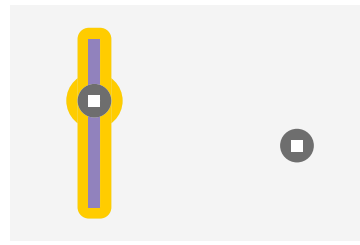
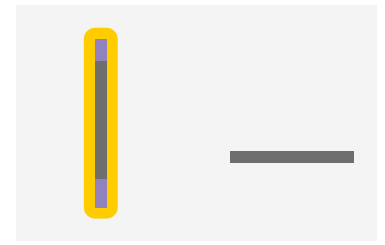

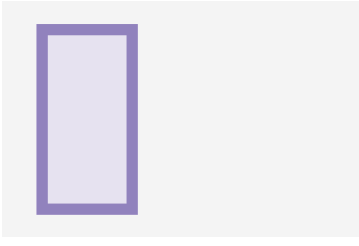
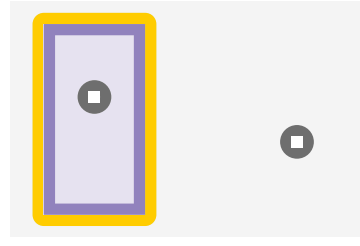
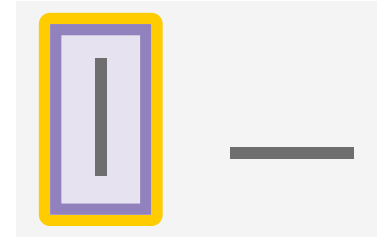
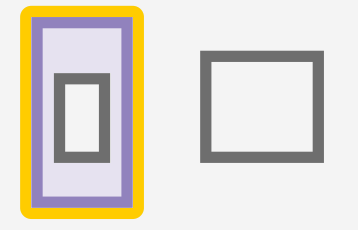
# Spatial / Topological Relationships

- A spatial relationship determines the topological association between two geometries.
- For example, you can determine if two geometries
  - Contain
  - Disjoint
  - Intersect
  - Overlap
  - Touch or
  - Within one another.

# Contains

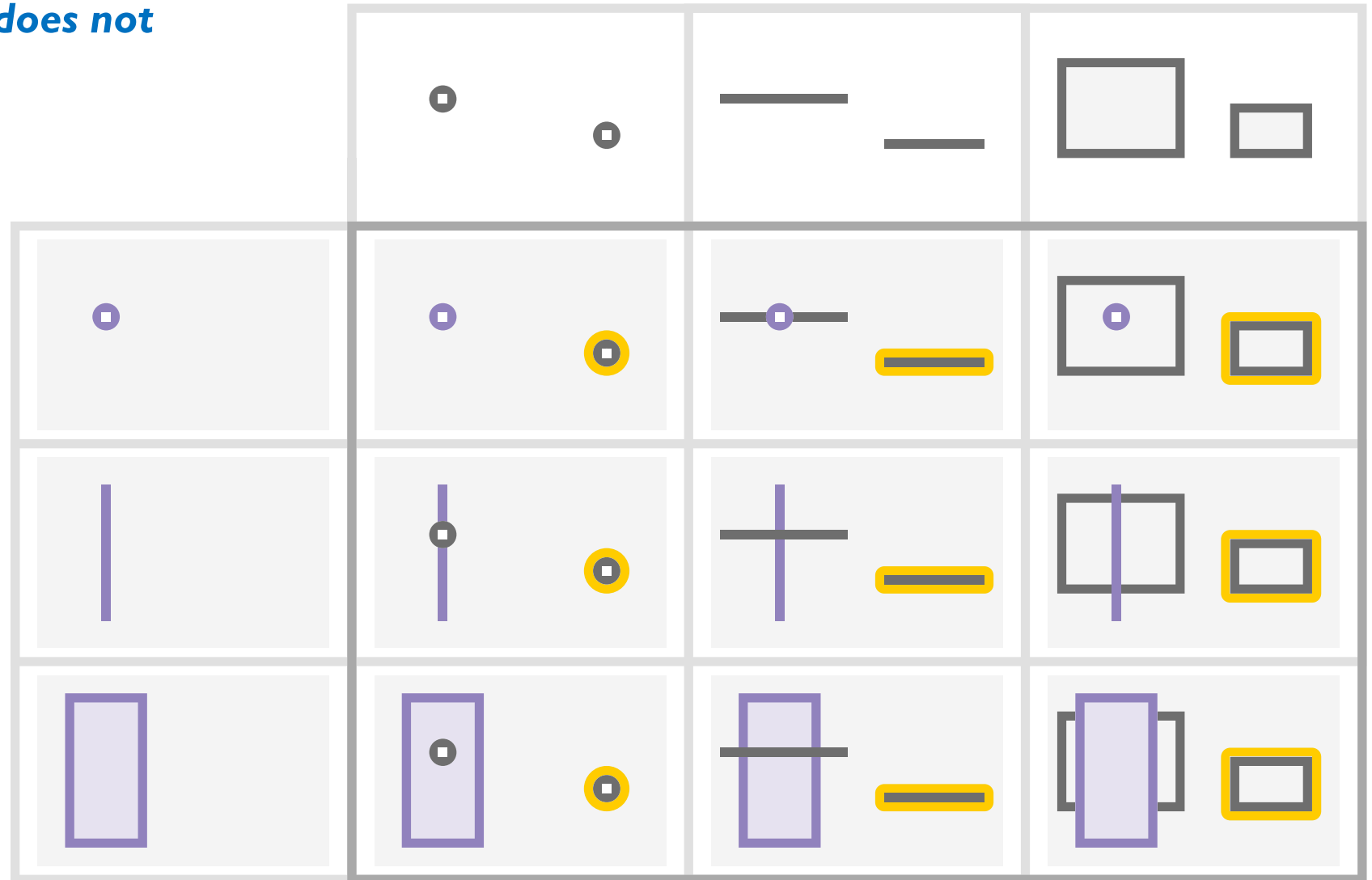
Returns true if one geometry contains another geometry.

*yellow = true*

# Disjoint





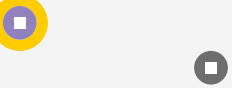




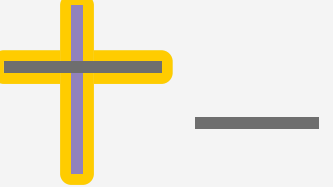
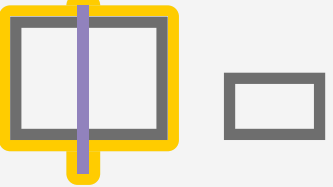

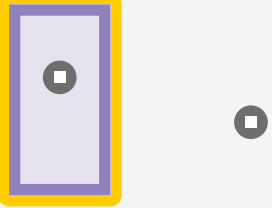
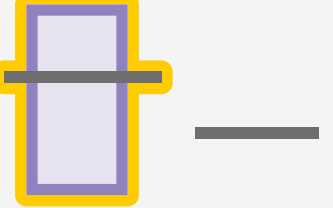
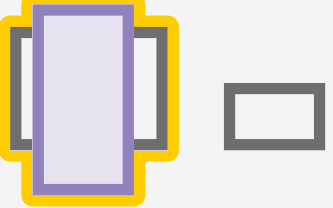
Returns true if one geometry does not intersect another geometry.





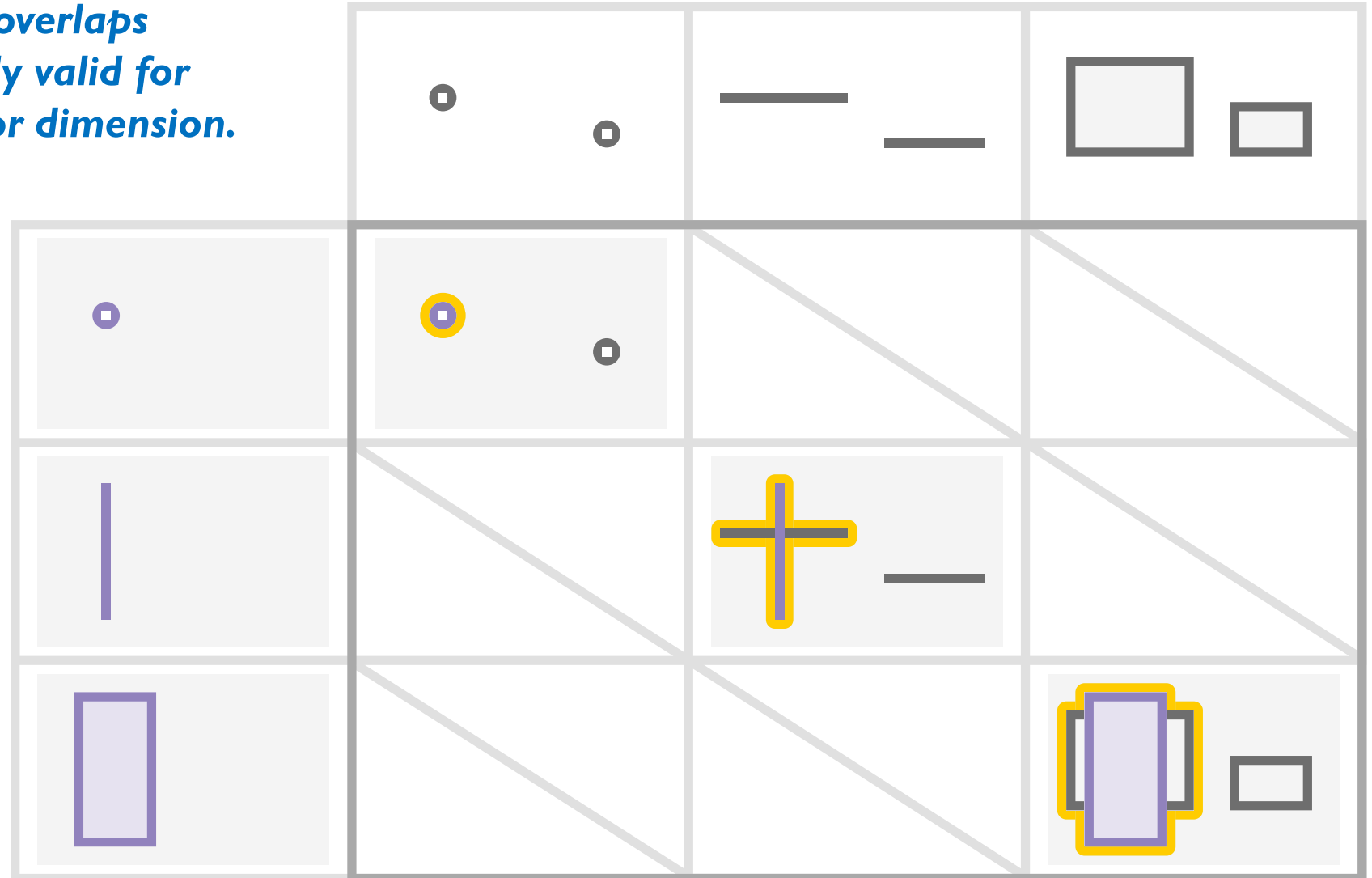
# Intersects

Returns true if one geometry intersects another geometry.

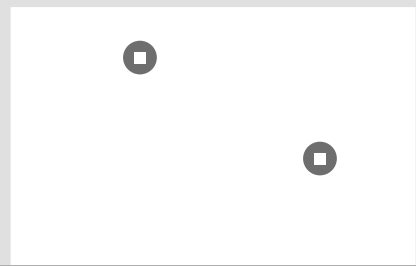
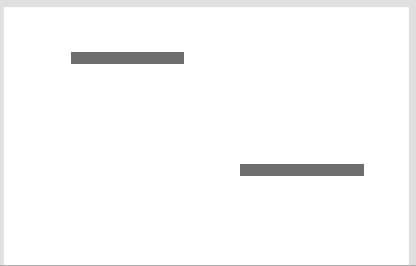
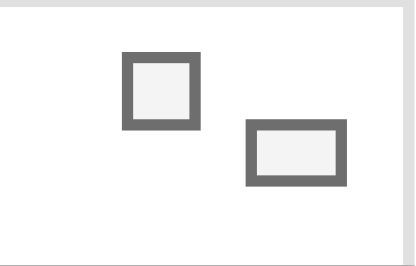
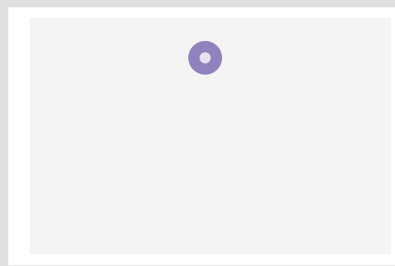

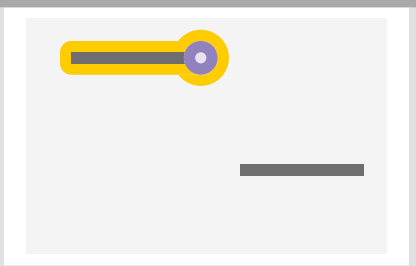
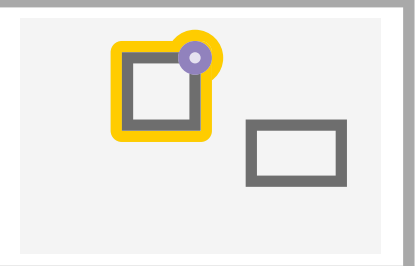
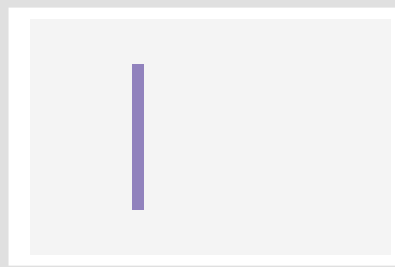
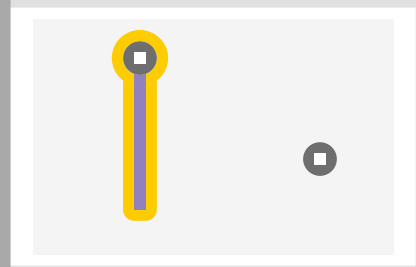
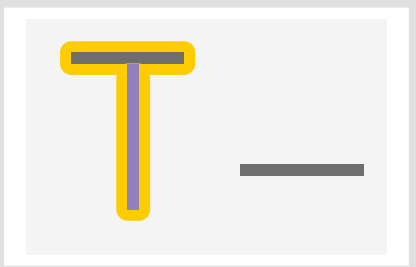
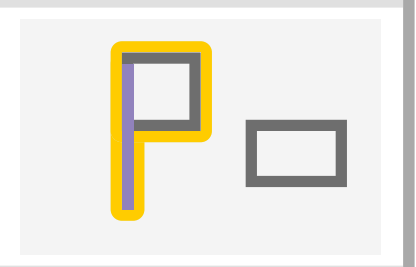
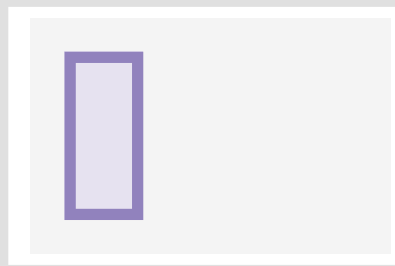
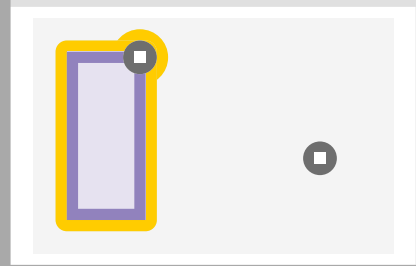
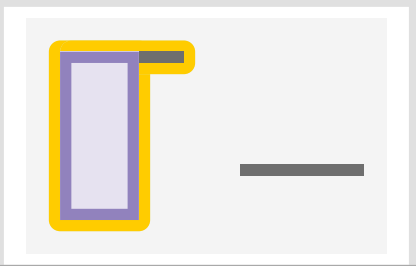
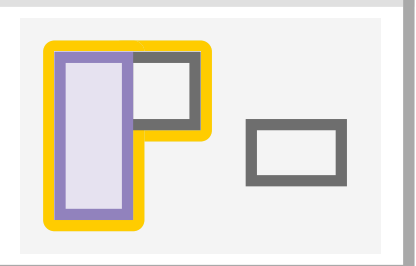
# Overlaps

Returns true if one geometry overlaps another geometry. NOTE: Only valid for geometries of the same type or dimension.



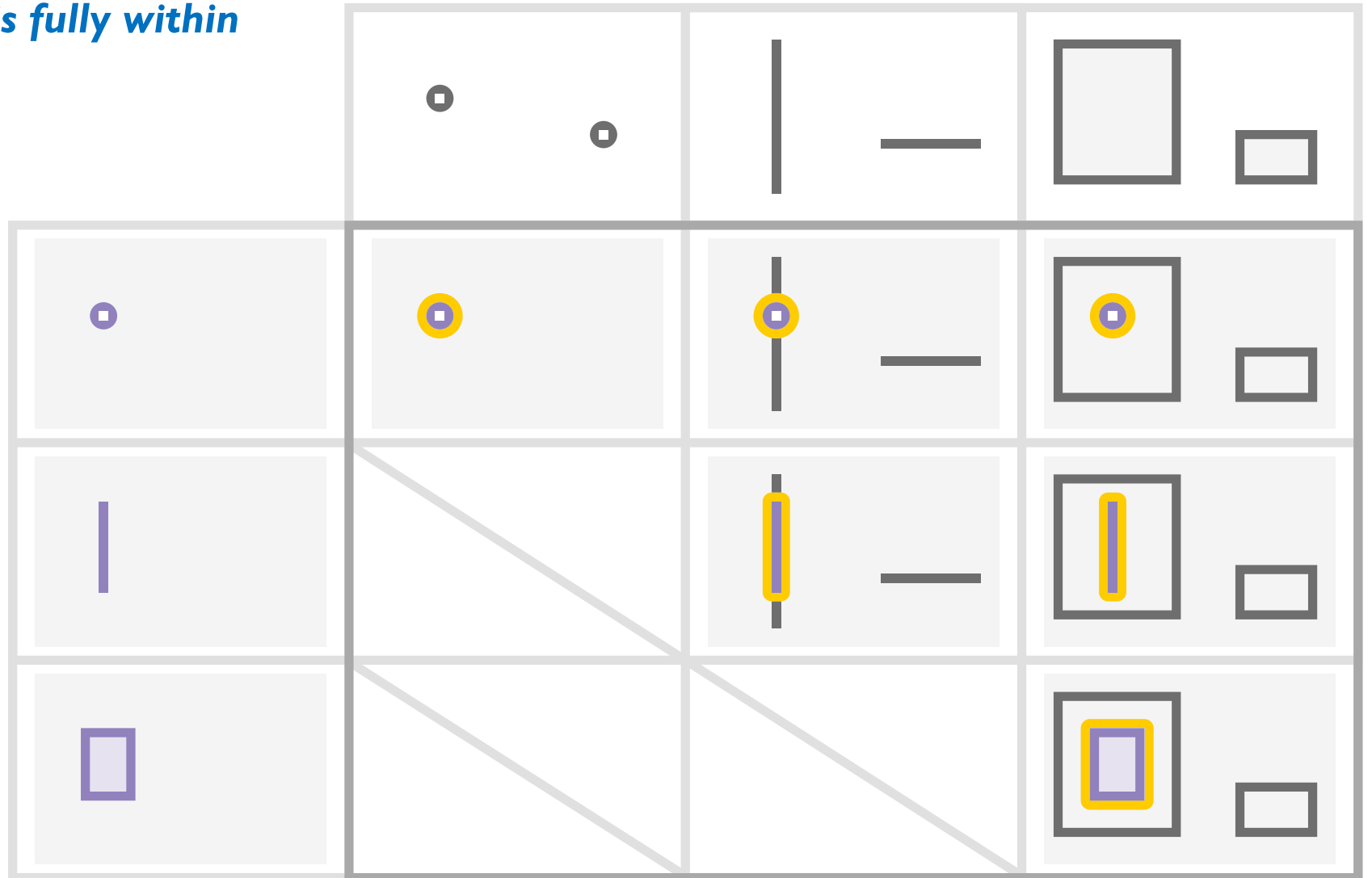
# Touches

Returns true if one geometry touches another geometry.

# Within

Returns true if one geometry is fully within another geometry.



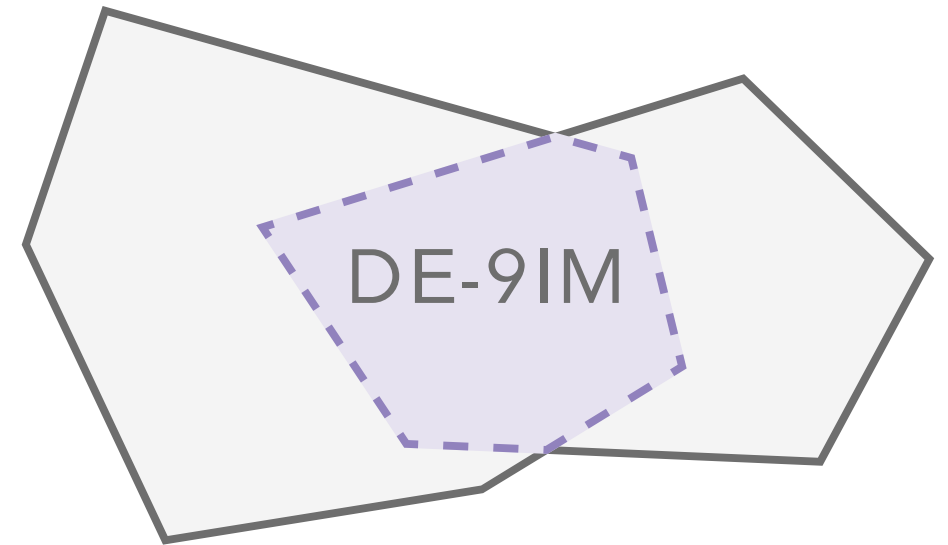
# Relation

When you choose Relation as the spatial relationship type, you can compare any possible spatial intersections between two shapes based on the following three aspects:

**Interior** - The entire shape, except for its boundary. All geometry types have interiors.

**Boundary** - The endpoints of all linear parts for line features, or the linear outline of a polygon. Only lines and polygons have boundaries.

**Exterior** - The outside area of a shape. All geometry types have exteriors.



# Temporal data

- **Temporal data represents state of a spatial object.**

## Discrete

- **Remains constant over a specific time interval**
- **e.g: Forest area, Transport lines**

## Continuous

- **Varies over time and can have separate values at any given point**
- **e.g: Temperature, Traffic**

**Spatial features can vary in terms of:**

- **Shape**
- **Location**
- **Attributes**

**Spatial features can be visualized over time in two ways:**

- **The shape and location is constant but attribute values can change over time.**
- **The shape and location of each feature dynamic over time.**

# Components of Time

- **Decadal: Census,**
- **Year: Climate, LU, Vegetation, Biodiversity, SDG Reports**
- **Monthly: Weather, G>Returns, Medical records, GW level**
- **Daily: Weather, Passenger data**
- **Hourly: Weather, Traffic**
- **Minute: Water discharge**



# Scale

- **Representations of Map Scale**

- **Graphic Scale / Scale Bar:**



- **Verbal Scale:**

- **One inch on the map equals twenty feet on the ground**

- **Representative Fraction:**

- **1:24,000**

*How do you  
define scale?*

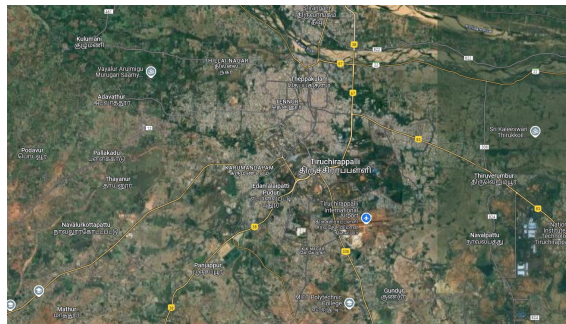
## Small scale

- 1:5,000 Feet
- Huge amount of detail
- Town / City Maps



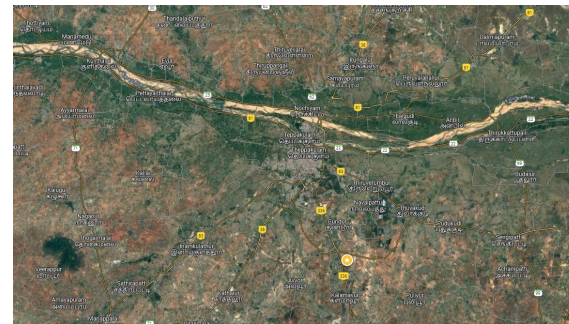
## Medium scale

- 1:50,000 Feet
- Shows numerous data
- SOI Topographic Sheets (1:50,000)



## Large scale

- 1:250,000 Feet
- Generic Data
- SOI Topographic Sheets (1:250,000)
- US Army Toposheets



***Scale = How  
much data  
can you  
show?***

# Resolution

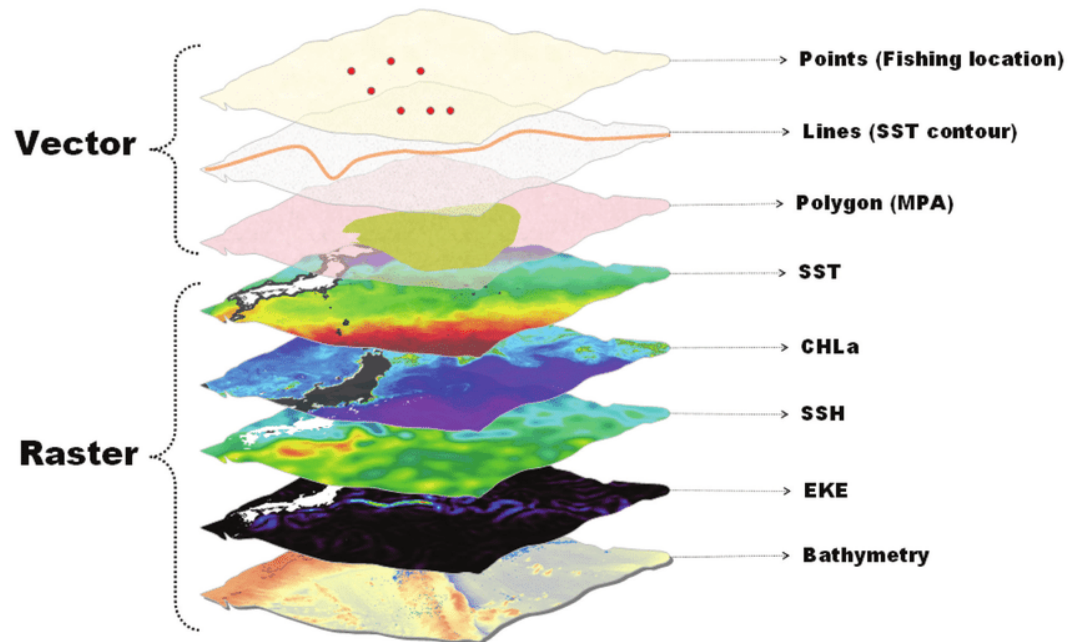
- It generally means one of two things:
  - Either the specific data precision of raster data or
  - more commonly, the spatial accuracy of the data

# MMU

- **Minimum Mapping Unit**
  - the specific size of the smallest feature that is being **reliably** mapped.
  - MMU helps you know when to collect specific data.
  - For example, if you are collecting building footprints and the MMU is 100 sq.m, you don't need to collect the footprint of buildings less the 100 sq.m.

# Spatial Data in Tables

- Spatial data is represented in two ways:
  - Graphical representation
    - Maps, charts, and scatterplots
  - Tabular representation



Table

Indo\_Desa\_region

FID	Shape	DESA	KODE	KECAMATAN	KABUPATEN	PROPINSI	STATUS IDT	STATUS
0	Polygon ZM	Asantola	110101000	Pulau Banyak	Aceh Selatan	Aceh	IDT	Desa
1	Polygon ZM	Teluk Nibung	110101000	Pulau Banyak	Aceh Selatan	Aceh	IDT	Desa
2	Polygon ZM	Gosong Telaga Selatan	110102000	Singkil	Aceh Selatan	Aceh	Non IDT	Desa
3	Polygon ZM	Gosong Telaga Utara	110102000	Singkil	Aceh Selatan	Aceh	Non IDT	Desa
4	Polygon ZM	Pulo Sarok	110102000	Singkil	Aceh Selatan	Aceh	Non IDT	Desa
5	Polygon ZM	Pasar Singkil	110102000	Singkil	Aceh Selatan	Aceh	Non IDT	Kota
6	Polygon ZM	Ujung	110102000	Singkil	Aceh Selatan	Aceh	Non IDT	Kota
7	Polygon ZM	Klangan	110102000	Singkil	Aceh Selatan	Aceh	Non IDT	Kota
8	Polygon ZM	Kayu Menang	110102000	Singkil	Aceh Selatan	Aceh	Non IDT	Desa
9	Polygon ZM	Teluk Ambun	110102000	Singkil	Aceh Selatan	Aceh	IDT	Desa
10	Polygon ZM	Rantau Gedang	110102001	Singkil	Aceh Selatan	Aceh	IDT	Desa
11	Polygon ZM	Teluk Rumbia	110102001	Singkil	Aceh Selatan	Aceh	IDT	Desa
12	Polygon ZM	Takal Pasir	110102001	Singkil	Aceh Selatan	Aceh	Non IDT	Desa
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14	Polygon ZM	Paya Bumbung	110102001	Singkil	Aceh Selatan	Aceh	IDT	Desa
15	Polygon ZM	Pemuka	110102001	Singkil	Aceh Selatan	Aceh	IDT	Desa
16	Polygon ZM	Kuala Baru Sungai	110102001	Singkil	Aceh Selatan	Aceh	Non IDT	Desa
17	Polygon ZM	Kuala Baru Laut	110102001	Singkil	Aceh Selatan	Aceh	Non IDT	Desa
18	Polygon ZM	Seping Baru	110103000	Simpang Kanan	Aceh Selatan	Aceh	Non IDT	Desa
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23	Polygon ZM	Gunung Lagan	110103000	Simpang Kanan	Aceh Selatan	Aceh	IDT	Desa
24	Polygon ZM	Suka Makmur	110103000	Simpang Kanan	Aceh Selatan	Aceh	IDT	Desa

**Thank You!**