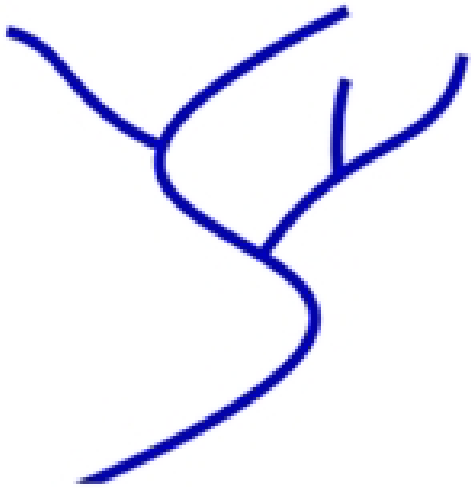
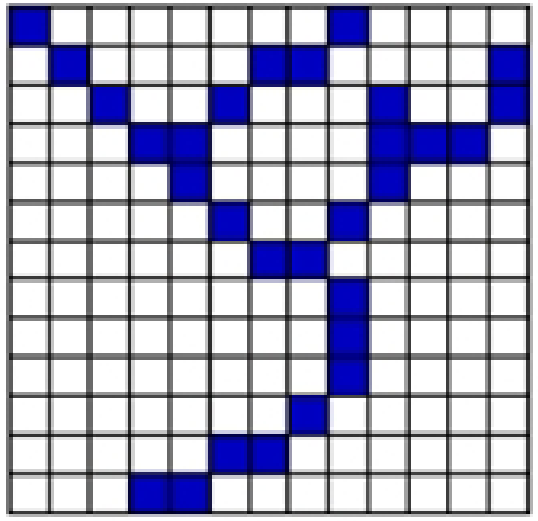
ECON6027 1B

Vector Spatial Data in R

FEATURE REPRESENTATION



Vector



Raster

Spatial entities can be represented as a **vector data model** or a **raster data model.**

We will focus on vector data from hereon

SPATIAL DATA FILE FORMATS (AMONG OTHERS)

Vector data file formats

- ESRI Shapefile: Popular format consisting of at least three files.
- GeoJSON
- KML: XML-based format for spatial visualization, developed for use with Google Earth.
- GPX: XML schema created for exchange of GPS data.
- File Geodatabase
- GeoPackage

Raster data file formats

- GeoTiff: Popular raster format. A TIFF file containing additional spatial metadata.
- File Geodatabase
- Arc ASCII: Text format where the first six lines represent the raster header, followed by the raster cell values arranged in rows and columns.

WARMUP EXERCISE

Go	Go to link.
Download	Download the shapefile containing the Master Plan 2014 Subzone Boundary.
Identify	Identify the different subfiles contained in the shapefile and the role of each file.

ESRI SHAPEFILE

A **shapefile** is a file-based data format native to ArcView 3.x software (a much older version of ArcMap). It stores a collection of features that have the same geometry type (point, line, or polygon), the same attributes, and a common spatial extent (scale).

Despite its name, a "single" shapefile is composed of at least three files, and as many as eight. Each file that makes up a "shapefile" has a common filename but different extension type.

Each file has a specific role in defining a shapefile.

File Extention	Content
.dbf	Attribute information
.shp	Feature geometry
.shx	Feature geometry index
.aih	Attribute index
.ain	Attribute index
.prj	Coordinate system information
.sbn	Spatial index file
.sbx	Spatial index file

WARMUP EXERCISE 2

Go

- Go to link.

Download

- Download the geojson file containing the **SportSG Sport Facilities locations.**

HANDLING SPATIAL DATA IN R

SPATIAL PACKAGES IN R

	Vector	Raster
New	sf	terra, stars
Old	sp	raster

R'S SPATIAL ECOSYSTEM

R's spatial ecosystem is rapidly evolving, with many packages in the area.

The package **sf** that we will extensively use, builds on its predecessor **sp**.

Once you attain some capability into various spatial data packages in R, return to https://geocompr.robinlovelace.net/intro.html#the-history-of-r-spatial to get some background information into the history of R-spatial

THE SF PACKAGE

The main package we will use

LET'S TAKE SF FOR A SPIN…

```
> library(sf)
```

If you are using sf for the first time:

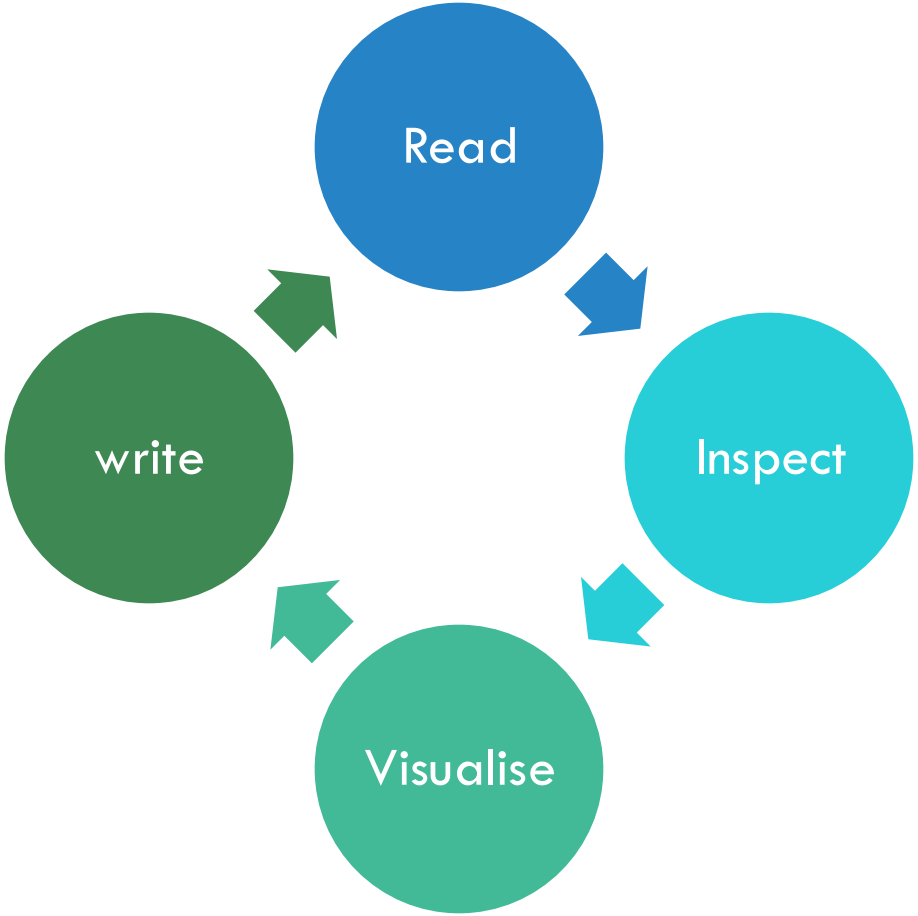
```
> install.packages('sf', dep=T)
```

See https://r-spatial.github.io/sf/ for help on installing sf or various troubleshooting methods.

To check if the package is there:

```
> is.element('sf', installed.packages())
```

WORK WITH SHAPEFILES USING SF PACKAGE



READ

Change directory to the path that contains the "shapefile" you downloaded.

Load the dataset using the st_read() function

INSPECT

```
> class(sg_pa)
```

```
> summary(sg_pa)
```

```
> head(sg_pa)
```

```
# or > class(sg_pa); summary(sg_pa);
head(sg_pa)
```

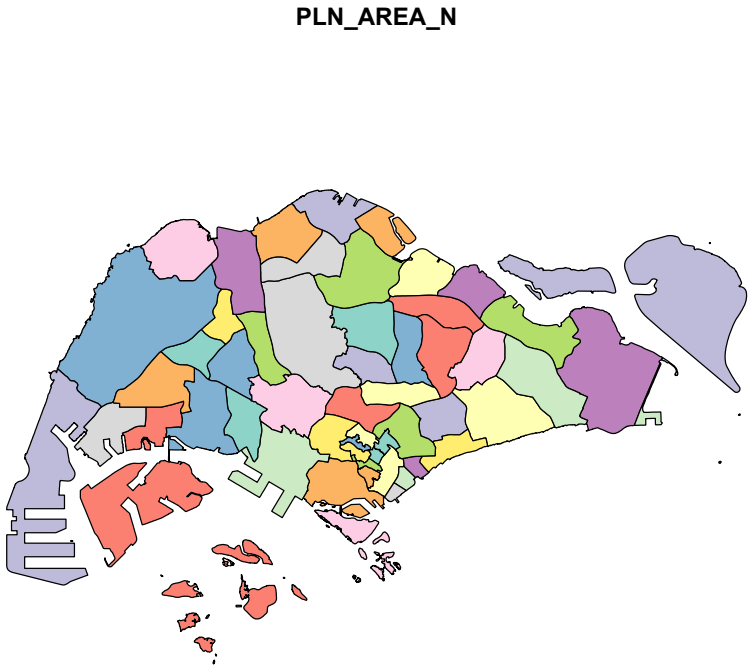
VISUALISE

Plot all

```
> plot(sg_pa, max.plot = 12)
```

Plot planning areas

```
> plot(sg_pa["PLN_AREA_N"])
```



Convert an sf object to shapefile (make sure there is no file of the same name or use "delete_later=T" to overwrite the existing file.)

```
> st_write(sg_pa, "MySingapura.shp", delete_layer=T)


Writing layer `MySingapura' to data source
`MySingapura.shp' using driver `ESRI Shapefile'

Writing 55 features with 12 fields and geometry type
Multi Polygon.
```

EXERCISE A

1. Load the geojson file containing the SportSG Sport Facilities locations using sf functionality.
2. Inspect your file.
3. Extract the geometry of the dengue clusters using st_geometry().
4. Plot the dengue clusters.

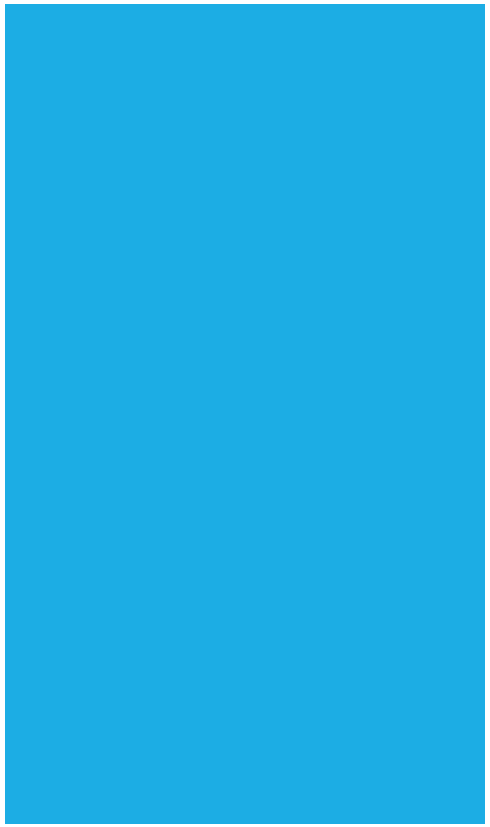
TAKE HOME POINTS…

Vector vs. Raster

Spatial scale

Spatial data file formats

Basic sf commands in R



REFERENCES

https://geocompr.robinlovelace.net/spatial-class.html

https://mgimond.github.io/Spatial/feature-representation.html

sf vignette: https://r-spatial.github.io/sf/articles/

sp vignette: https://cran.r-project.org/web/packages/sp/vignettes/intro_sp.pdf

Brunsdon and Comber, Ch 3: https://bookdown.org/lexcomber/brunsdoncomber2e/Ch3.html#introduction-to-sp-and-sf-the-sf-revolution