Tuesday 16 October 2018

Week 11 – Geospatial and pitch coaching

Open at 0800 for an 0830 start

Lesson concepts to check:

* I can identify the basic concepts of spatial data: space, location and distance, and understand the different methods we use to talk about these concepts, including absolute, relative, topological and cognitive measures.
* I understand the basics of geospatial data analysis, including set theory constructions, spatial indices and geocoding, and can see areas where I could apply these in my own work to add more context to existing datasets.
* I can see how geospatial processing can form part of a larger machine learning or data science pipeline, particularly as a feature generator for machine learning algorithms
* I understand how to design an effective pitch that considers the audience, communication styles and content structure. I can identify good and bad elements in others pitches and provide constructive feedback to them to make improvements
* I feel confident about delivering my capstone pitch next week and am looking forward to it

To do:

* Show example of using Geocoding API from Google? <https://developers.google.com/maps/documentation/geocoding/intro>
* Build workflow using suburb boundaries to segment climate data for ATCO.

# introduction to geospatial data (Jess, 120 minutes, 0830-1030)

## Why is location important? (30 min)

### **All:** discussion – different types of maps. What maps have we used today?

### Maps deal with the three fundamental concepts of spatial analysis: space, location and distance.

### **Space:** What is space? Different types of space:

#### **Absolute space** – mathematical space – everything is given an (x, y, z) tuple and positions are unambiguous. Example: geological map of WA

#### **Topological space** – can be thought of as relative space. Used to represent connectivity between features of the world. Precise measurement not as important. Example: Railway map for the metro.

#### **Cognitive space** – reflects people’s beliefs, experiences and perceptions about places. You might know how to get to this room in the building quite well but not the rest of the building. Emphasizes space via relevance to you. Example – a mud map to get your tradies to site

### Location – can be described in four ways:

#### **Absolute** – Latitude and longitude – an unambiguous descriptor of location, expressed as a coordinate. Can’t be confused with any other location.

#### **Relative** – Site (physical attributes of location) and situation (location relative to other places) – Perth is located far from other cities, near raw materials etc. Or 191 St Georges Terrace

#### **Cognitive** – compiled from personal knowledge, experiences, and impressions: eg traditional knowledge of waterholes as a resource, then a stock route, then a 4WD track. Same physical location but different perception.

#### **Nominal** – ‘Where were you when…?’ Linking space and time, e.g. where were you when you heard about 9/11?

### Distance – can be expressed as:

#### Absolute – a physical unit of measure (e.g. kms between two assets

#### Relative – Generally calculated using time, effort or cost (will differ from absolute – what happens when you go over a mountain range?). Similar – voting maps sized by number of seats vs area.

#### Cognitive – individual perception of distance (e.g. driving in NZ vs driving in Australia)

### What do we worry about space at all?

#### **First law of geography:** Everything is related to everything else, but near things are more related to each other

#### Link through to time causal links – time and space processes?

## Geospatial data types – a simplified conceptualization of reality – contains object and attributes (10 min)

### Object – determined by whether we are describing a discrete (e.g. river, lake, outcrop) or continuous (e.g. temperature, elevation) spatial phenomenon

#### Raster geospatial data (geophys, orthophotos, remote sensing) – is this the only way (consider a triangular irregular network – point, edge, face)

#### Vector geospatial data – point, line polygon

#### Point clouds

### Attributes: anything that we want to describe about the object – all discuss from week 2 what our attributes can be

### **All:** 5 min discussion – come up with some examples of datasets and ways we can use

## What’s special that we have to worry about (20 min)

### Datum – reference surface for measuring locations on the earth. Global ones specify an ellipsoid – most commonly used is the World Geodetic System of 1984 (WGS84). Local datums are fixed to the Australian continent (generally GDA94) although new dynamic ones are arriving for Australia (GDA2020) – and then transition to the Australian Terrestrial Reference Frame (ATRF and ITRF) – discuss why a datum is important with automated instruments

### Projections – what is this for?

#### Map distortionsConsider area preserving vs shape preserving (major properties, can only pick one) and distance and direction (minor properites – exist with both major properties but not everywhere on map).

### Sources of error, resolution

### Formats

#### Raster: GeoTiff & other formats – more or less an image with some metadata showing the grid parameters (start, stop, step, and an affine transformation to warp to grid projection)

#### Vector: GeoJSON, Shapefile (record by record geometries, according to some schema).

#### What are some easy things to do with this data? What are some potentially hard things to do?

## Things we can do (20 min)

### Standard geospatial operations (vector)

#### Selections – the basics of a spatial index (rtree)

#### Set geometry operations, buffering/ eroding, joining/dissolving, splitting using overlay operations (intersect, union, join)

#### Point in polygon algorithms as an introduction to spatial indices

#### Geocoding:

##### Linear geocoding (find a point along a line, e.g. 191 St Georges) – estimate from start and end points of the block. Not as accurate but easy to implement and data is commonly available

##### Area geocoding (find a point in a polygon) – much more accurate but requires lots more data

##### Generally, we don’t just want to do this ourselves – use an API!

## Example: Using Google Developer API to geocode addresses (40 min)

### All: Work through notebook to send and receive messages from Google Location API.

# Morning tea (1030-1100)

# Using geospatial data to add value to existing datasets (jess, 60 minutes, 1100-1200)

## Working through ATCO fault data and suburbs to extract temperature values to apply to a model.

# lunch (1200-1300)

# Pitch coaching (holly, 90 minutes, 1300-1430)

## Review Pre-prepared pitches - 60 mins

### Each participant presents their 1-minute pitch in person or via video (all videos to be pre-loaded on Holly’s laptop) followed short 1-2 min Q&A during change over.

## Pitching Intro - 30 mins

### WHY are you pitching and WHO are you pitching to?

### Setting yourself up to achieve what you need with your pitch and considering your audience.

## HOW are you pitching?

### Building trust and authenticity with body language, tone and appropriate language.

### Using Powerpoint - Maximising use of images, text, graphs and colour.

## WHAT are you pitching?

### Suggested pitch structures - Start with your Why. Tell a story - what’s the problem you are solving and for who? How are you going to solve it? Showcase the value you’ll deliver. Address any worries or fears.

# afternoon tea (1430-1500)

# Pitch coaching Part 2 (holly, 90 minutes, 1500-1630)

## Review and critique pitches (15 mins)

### Good example - Canaria investor pitch

### Bad example - Hackathon Sydney 2017 team pitch

## Individual Exercise (10 mins) - write or review your 1 minute elevator pitch for your Capstone project.

## Group Exercise (60 mins) - 2 streams

### Each group of 4 has a 15 minute private session to review their pitch and get personal feedback. Includes 5 minutes pitch time, plus 10 mins feedback and Q&A

### During that time, each group not in a private session, reviews each others 1-minute pitches and provides feedback. Can do across group if that works better.

## Final wrap up (5 mins)