GEOL 452/552 - GIS for Geoscientists I

Lecture 2
Plan for Today:

• Example of GIS project
• Connect to delphi (ArcCatalog and Windows network share)
• How to take screenshots
• lab: chapter 1 tutorial

• Everybody got the textbook?

• Questions / problems? (See me during break)
GIS example Application: Wildlife habitat model

- Q: Where in the forest should we cut timber so not disturb the elk population?
- We have: Data about vegetation (types of plants) good for food? good for cover?
- Need the Suitability for each part of forest for cutting and NOT disturbing the local elk population
  - 0.0 = do not cut here!
  - 1.0 = OK to cut trees from here
- Simplified HABCAP model (U.S. Forest Service)
• **Suitability Map** shows Suitability (number) for each location with the forest?

• Map helps to manage forest
  (env. concerns? area? access? $?)

• Calculate Suitability ($S$) from Cover (CV), Food (FV) and Proximity (PV); everywhere within the forest

• All numbers: 0.0 to 1.0 (0 = bad, 1 = good)

• $S = (\text{CoverValue} + 3 \times \text{ForageValue} + \text{ProximityValue}) / 5$

• How to get the three values (CV, FC PV)?
Getting numbers (0.0 - 1.0) for food value (FV) and cover value (CV)

Each polygon contains a COVSS “code” for “type of forest”

Each polygon also has a **cover** value (CV) and **forage** value (FV) as direct translation from the type of forest (COVSS)
• From CV and FV, we can derive numerical “likelihood” values
  \( C \) = primarily cover, \( F \) = primarily food or \( B \) = both
• Also: Dissolve (merge) adjacent polygons of same value (C,F,B)
Proximity (distance) analysis:

- Rational for distance:
  - Elk need to feed and hide (Elk life is simple)
  - B is good (we know it has a mix of F and C)
  - Cover (C) close to to Food (F) is also good!
- How to find areas where C touches F?
Proximity analysis (PV values)

- Use a buffer operation to divide food polygons into “bands” - based on distance
- Each polygon gets a PV value
- inside a polygon: low PV values (center = 0.0)
Calculation of overall suitability

- We have Cover (CV) and Food (FV) from vegetation type
- $HS = \frac{(CV + 3 \times FV + PV)}{5}$ (why is that always 0.0 to 1.0?)
- HS is the final **elk habitat** suitability rating for each polygon
- We should conduct logging operations only where HS is low
But: Roads are bad for elk!

- create 60 m buffer zone around major roads (black)
- lower the suitability value by 0.3 inside road buffers
- Overall result: locations for logging? HS should be low
Questions?
Network drive (letter):

- My Computer > Tools > Map Network Drive
- Drive: Z:
- Folder: \delphi\geo1552

- Or: Enter \delphi\geo1552 as Address in My Computer (File Manager)

- Or: Start > Run > \delphi\geo1552
How to play MGIS videos

- Bring headphones
- Unmute system audio
- Open a folder to `\delphi\GEOL552\data`
- 2 x click on `\delphi\GEOL552\data\MGIS_video_index.htm`
- (Opens Internet Explorer window with links)
- Click on link
- Should play video in MS Mediaplayer (Express setup)
ArcCatalog (start it now via shortcut)

Start ArcMap and ArcToolbox

Remote
Connect to folders

Folder tree

Menu/tool bars

Contents
Preview
Metadata

Display window

Remote
Connect to folders
ArcGIS connection to delphi server

- ArcGIS needs a remote connection to GEOL552 folder on Delphi server

- GIS lab already has two connections:
  - `\delphi\GEOL552\data` - for textbook data (clean copy), video clips, other data (miniprojects, etc.)
    - read-only access for you
  - `\delphi\GEOL552\students` - your student folder (check now)
    - read/write for you (your folder only)
Copy textbook data to your student folder

- Copy the mgisdata folder from GEOL552\data to your student folder
- Use this copy for your exercises
- From ArcMap, always save into your personal folder
- (If you delete something by accident - copy again from the GEOL552\data folder)
Making a new remote ArcGIS connection

- Sometimes you need ArcGIS access to additional folders
- Let’s connect ArcCatalog to \delphi \GEL552\temp
- Press Connect Icon in ArcCatalog
- Find delphi - GEOL552 - temp (or type in \delphi\GEOL552\temp)
- Click OK
How to use the screen capture tool

- Gadwin Printscreen capture program has been installed on the GIS Lab PCs
- (if it’s not running now, start it via icon on Desktop)
- Makes a jpeg image file (at very good quality - 95%)
- (To reconfigure - double click on taskbar)
- Also stores image on “internal clipboard” (use for MS Word)

Try it now:

- Open Word (Program Files - MS Office)
- press Printscreen Keyboard Key (upper right)
- Grab rectangle via mouse and press the Enter key
- OK the preview
• Option 1) paste directly (Control-V) into Word file
• Add some text, save as Printscreentest.doc in your student folder
• Option 2) save as image (jpg) file in your folder and add to (drop into) Word later
• Good names (e.g., HW2_ex3.jpg for homework #2, exercise #3) will help you later!
• Reminder: you need screenshots and explanations to get points for homework assignments
• Never save files only on C: drive (Desktop or MyDocuments), in the GIS lab the C: drive is wiped clean at logout!
• Questions?

• 5 min pause, lab exercises next
Homework 1 (due in 1 week)

• Chapter 1 exercises 1, 4 and 6 (p. 51)
• Make a Wordfile HW1_<yourname>.doc
• Explain what you did + screenshots
• (no need to be fancy, keep the Word doc simple)
• Ignore the capture blurb on the top of page 51 - use the printscreen tool instead
• Hand into Word file as WebCT attachment
Example of a “good” home work exercise (3 pts)

Ex 2.) What is the coordinate system, projection, units and extent of US_lower48.shp

I opened Data Frame properties – Coordinate System in the layer’s data frame and looked at the text:

a. The coordinate system is the UTM in zone 13 North in NAD 83.
b. It is projected as Transverse_Cylindrical

c. The units are found in: Dataframe – General

def. The map linear units are in meters and angular are in degrees.

The extend in North-South direction (y) and in East-West direction can be calculated from the frame coordinates found in Data frame – Data frame – Fixed Extent:

d. $y = T-B = 4888165.255196 - 4871783.046157 = 16382.209039$ m

e. $x = R-L = 650253.625006 - 630271.058075 = 19982.566931$ m
Lab:

- ch 1 tutorial pp. 36 - 50
- (copy mgisdata folder from GEOL552/data into your folder)
- data will be in //delphi//GEOL552/students/<your name>/mgisdata, not in c:\MGIS\mgisdata
- start tutorial now - ask if you’re stuck
- “group” work is OK
- Write the answers to the tutorial questions in your text book
- However: you do not need to send me these tutorial answers!
- hint: steps 7-& and 15-& in the tutorial are very similar to homework exercises
How to operate any computer software

(XKCD inspired)

START

FIND A MENU ITEM OR BUTTON WHICH LOOKS RELATED TO WHAT YOU WANT TO DO.

I CAN'T FIND ONE

PICK ONE AT RANDOM.

OK

OK

I'VE TRIED THEM ALL.

NO

HAVE YOU BEEN TRYING THIS FOR OVER HALF AN HOUR?

YES

ASK SOMEONE FOR HELP OR GIVE UP.

CLICK IT.

GOOGLE THE NAME OF THE PROGRAM PLUS A FEW WORDS RELATED TO WHAT YOU WANT TO DO. FOLLOW ANY INSTRUCTIONS.

NO

DID IT WORK?

NO

YES

YOU'RE DONE!