

Dynamic Segmentation Analysis in Trail Network of Lake Louise Area

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December, 2002

Introduction

Dynamic segmentation is the process of transforming linearly referred data (commonly called events) stored in a table into a feature which can be displayed on a map. Dynamic segmentation contains two major components: route system and events. First of all, a route is a linear feature where attributes are defined. A route defined on a set of four arcs. The route system have INFO files, a route table (RAT), and its related section table (SEC). Secondly, events are the attributes which associated with a route. For example, trails of Lake Louise area are linear events in dynamic segmentation. As a result, due to the increasing use of trails in Lake Louise area, dynamic segmentation becomes an important element to analyze the proper management for the trail network in Lake Louise Area.

Study Area

Lake Louise, located inside Banff National Park which belongs to both Province of British Columbia and Alberta. The map sheet used in this study is from NAD83, section 8. Most of the study area is surrounded by mountains and glaciers where trails can be a significant tourist attraction. The major road is Highway No.1 which is the main transportation pattern in this area

Data Sets

- The data used in this study are mainly TRIM data which contain in vectors format. All the data are in e00. format originally. These following data are the mostly used for this analysis:
- Contours (for both analysis and creating of TIN/Digital Elevation Model)
- Roads
- Trails
- Campgrounds
- Other useful data for analysis such as picnic areas, water sources, etc.

Procedures

- Downloading the data from source (from Geog 413 instructor).
- Convert all the data from e00 files in vectors folder to coverage (points, lines, polygons) files.
- Use Arcview to examine some of the particular features
- First of all, the satellite image points out a general idea of geological formation of study area where mainly composed of mountains and river basin at lower elevation. (Figure 1).

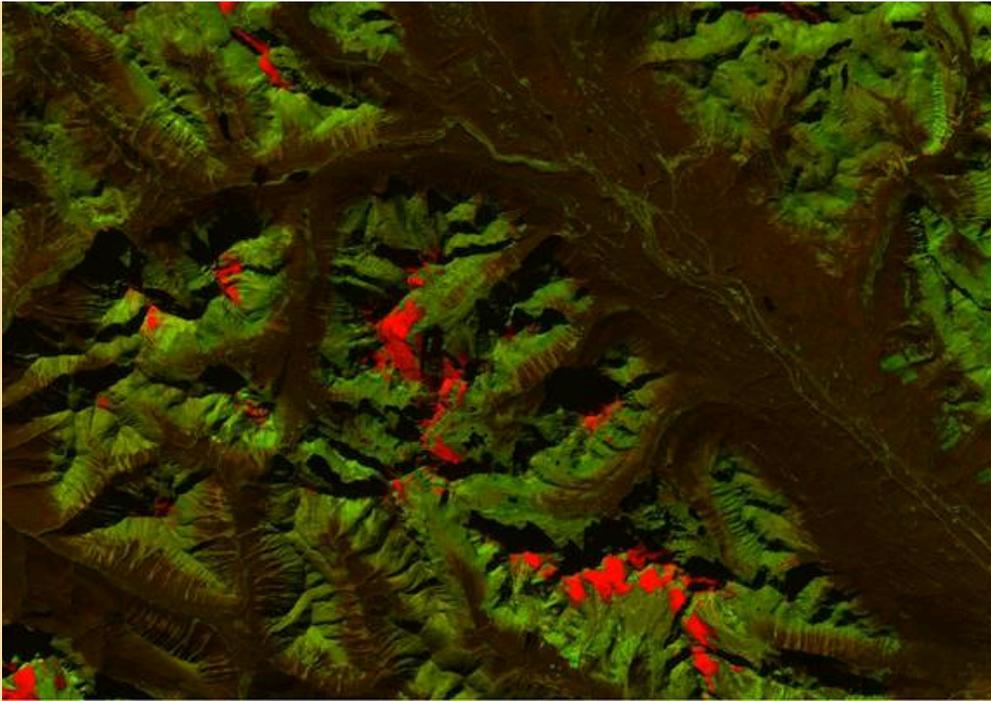


Figure 1. Satellite Image of Lake Louise Area

- In order to show a better view of the area, I used ARCTIN command in ARC to create a TIN data/Digital Elevation Model from contour lines (Figure 2).
- When creating TIN data, hillshading and hypsometric options are used to make TIN more like a 3-D view.
- After TIN was created, the command of TINLATTICE was used in ARC to generate a lattice of points from the TIN.
- Lattice is a grid of elevation values which will be demonstrated in Figure 3.



Figure 2. TIN/Digital Elevation Model for Lake Louise Area

Lattice View of Lake Louise

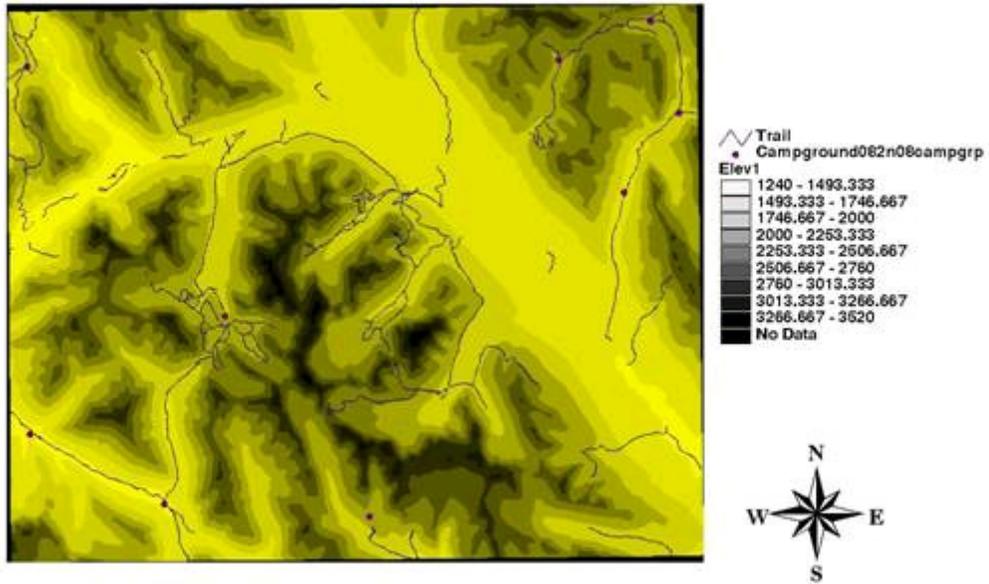


Figure 3. Lattice view for Lake Louise area

Contour View with Selected Features of Lake Louise

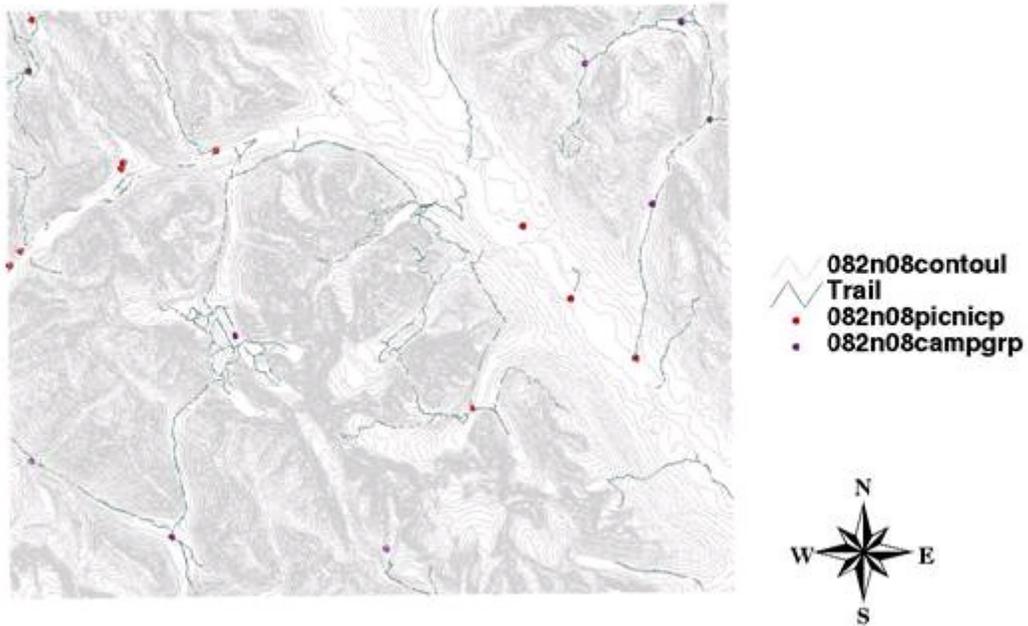


Figure 4. General View of trails, picnic areas and campgrounds features of Lake Louise Area

- By using Arcplot to do the analysis of dynamic segmentation. The following point and linear features will be used: 1) green dot - campgrounds; 2) green lines - trails; 3) gray line - roads/highway; 4) blue dot - picnic areas. (Figure 5)

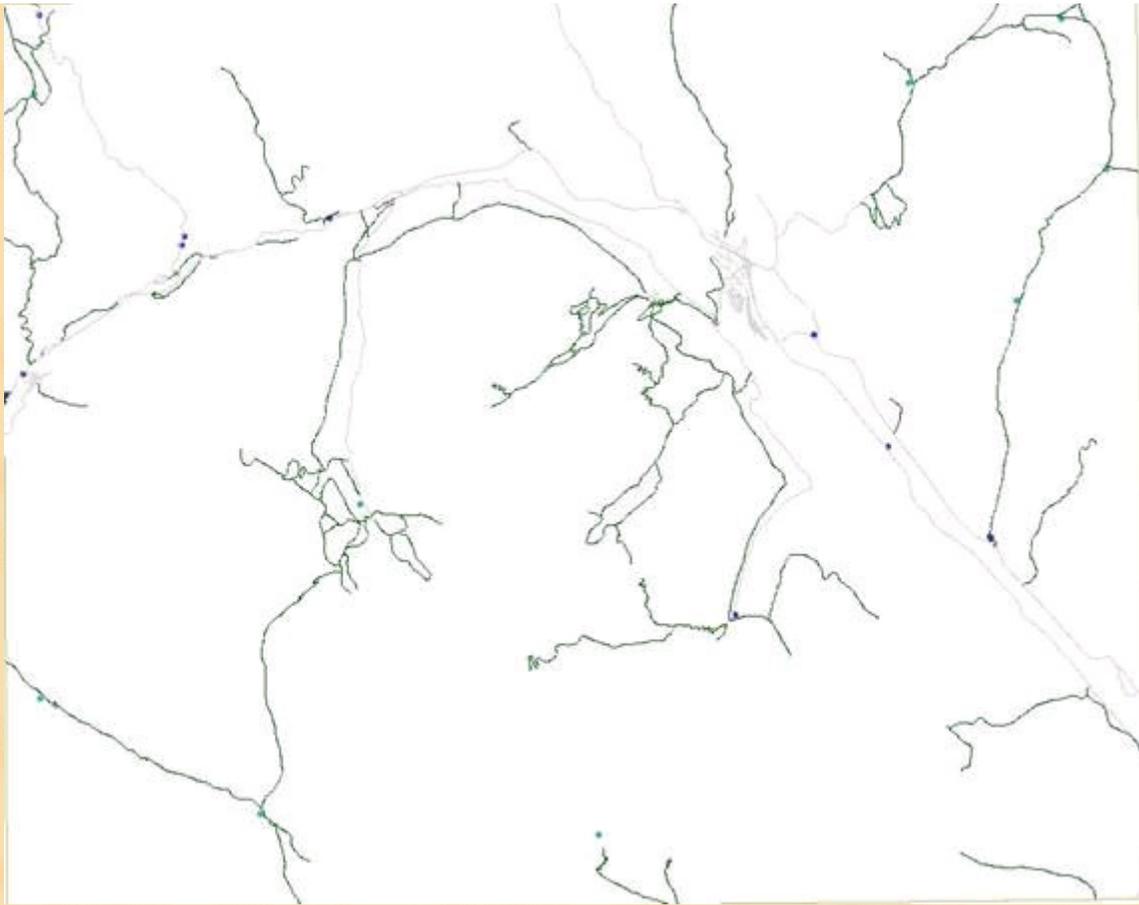
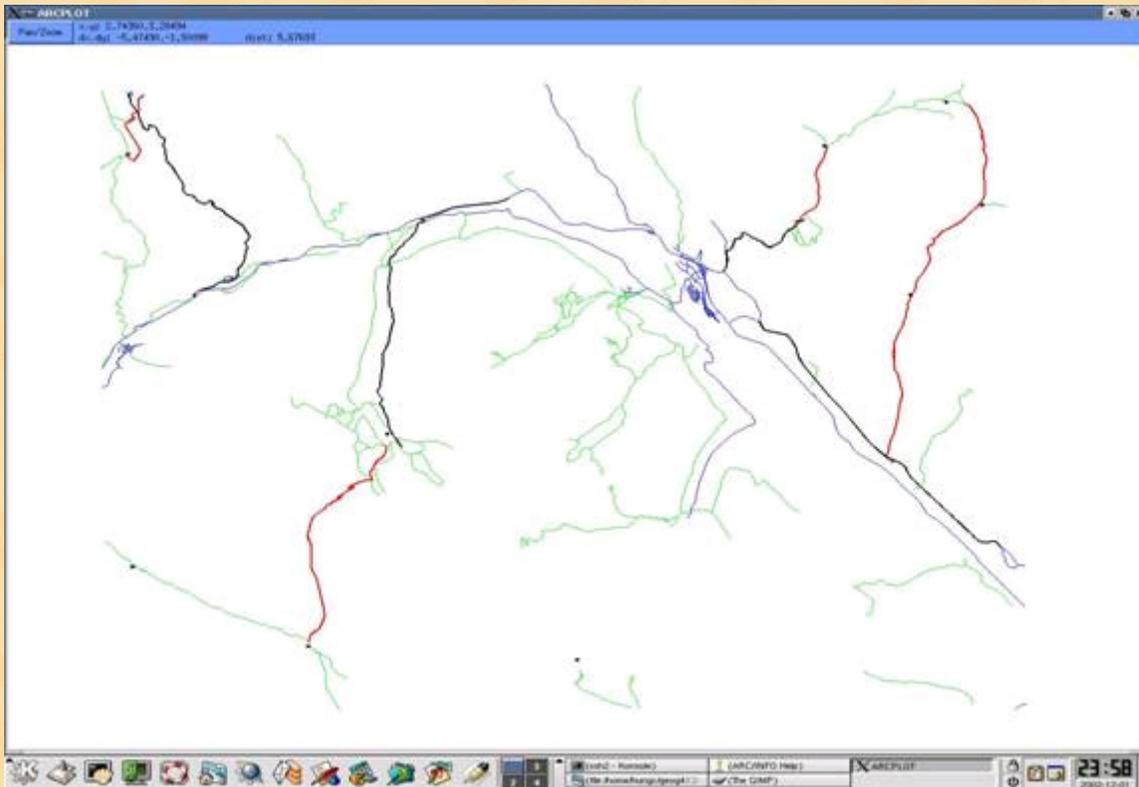


Figure 5. Designed Features used in Dynamic Segmentation (refer to pg.5 for legend reference)



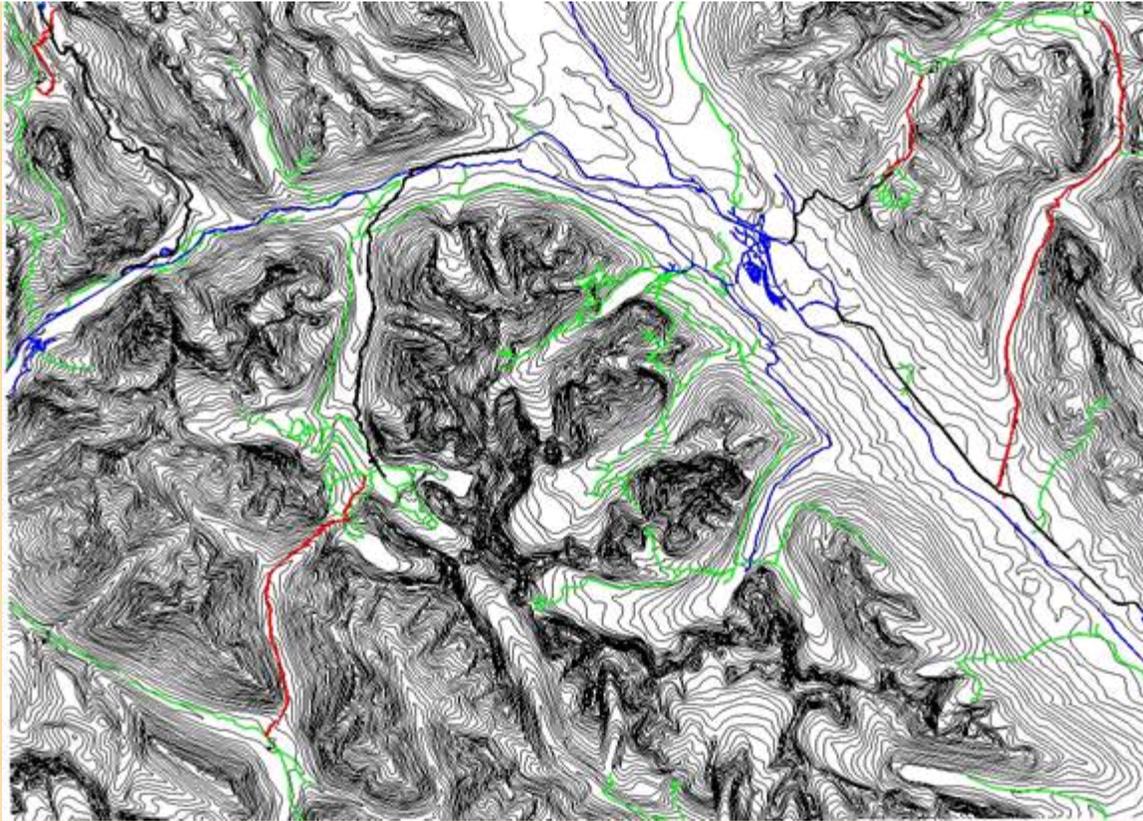


Figure 6 & 7. Results after dynamic segmentation analysis for Lake Louise area

- Legend:
- Green line - trails
- Red line - trail access
- Blue line - roads
- Black line - vehicle access
- Black dot - campground
- The main theme is based on the accessibility to the campgrounds and trails. Since some of the trails and campgrounds are disconnected from the main road which may cause difficulty of accessing those facilities, the black lines - vehicle access have been created to provide more convenient way of getting to the destinations.
- The red line - trail access which is connected both with the vehicle access and campgrounds to provide an alternative way for tourists to choose either walking or driving to the campgrounds. As a result, the gates may be established at the intersections of trail access and vehicle access.
- Figure 7 shows the features with contours lines. This image can provide a general idea for tourists/hikers/campers of the level of difficulty to access those trails and campgrounds. This may help them to make a decision of either walking or driving to their final destinations. The denser of the contour lines, the more difficult for public access to the park facilities.

Problems

The main problem is how to gather more detailed and useful information. For example, wildlife habitat area is an extremely significant factor in tourist/trail management. The increasing use of park facilities such as campgrounds and picnic areas, the more disturbances for the wild life in National Park. So how to collect more useful data for wildlife habitat management associated with park facilities is one of the most important topics in this analysis for the future.

Conclusion & Future Work

The dynamic segmentation is a pretty efficient tool to create a route system for trail management in a highly-used area such as Lake Louise. When it comes to tourist management, dynamic segmentation can provide quick and accurate information of trails, campgrounds and other facilities accessibility for tourists. After measurement and adjustment from dynamic segmentation, the settings of these park features can be managed in proper locations where have minimal natural impact (like avoid wildlife habitat area) and least restrictions for park visitors. The future of tourist management and dynamic segmentation need to focus on the wildlife habitat management like mentioned in Problem section. Some of the people still lack of senses of the interaction between human and nature. Therefore, how to balance between human-use areas and animal habitat areas based on GIS analysis is becoming a more important aspect in the future.

References

1. Geog 413 Advanced GIS Lab Manual.
2. Arc/Info 8.1 Help Menu

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