80-805

LANDSAT SCENE REGISTRATION PROCEDURES FOR THE 1980 KANSAS LANDSAT PROJECT

by

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Registering the LANDSAT scenes for the 1980 Kansas Project will require a significant amount of cooperation among all elements of the Remote Sensing Branch in order to be done successfully. Twenty LANDSAT scenes need to be registered in only five weeks, i.e. four scenes must be registered each week.

The most efficient way of accomplishing this task within the specified time period is to separate the various functions required in completing the registration of each scene. The major components of the registration task with greyscales are as follows:

1. Locate the 36 initial control points within the LANDSAT transparency at 1:1,000,000 scale,

2. Digitize the control points and their latitude, longitude coordinates (use the 1:1,000,000 transparency overlayed on the index map),

3. Print the greyscales for each control point at WCC or use the Printronix when available,

4. Locate the maps to be used (from the map index number in step 2),

5. Pair the greyscales (printed in step 3) and the USGS quadrangle maps (located in step 4),

6. Locate corresponding points on the map and greyscale,

7. Digitize corresponding points on the greyscales and maps from step 6,

8. Evaluate the 3rd order polynomial with the corresponding points file determined in step 7 and,

9. Correct errors in the corresponding points files to obtain an accurate set of polynomial coefficients for the registration file.

Separation of the component parts of registration among different individuals should allow for more rapid registration to be accomplished since each person or group would have clearly defined roles in carrying out a LANDSAT scene registration. Assignment of these tasks would fall along present divisions of labor as follows:

1. Steps 1, 6, 7, 8 and 9 would be accomplished by one individual to whom registration of that given scene would be entrusted.

2. Steps 2, 4, and 5 would be done by Sandy Stutson's group under the direction of the person responsible for that scene, and

3. Step 3 would be done by Peggy Pearsall and Barbara Lussier for greyscales done at WCC. Otherwise, Sandy's group will supervise the Printronix.

Additionally, testing a method of registration not requiring the use of greyscales i.e., only using the photo and maps will also be tried. Accuracies of this method will be compared with that using greyscales and a decision whether or not to use it in mass will be made.

Steps in registration without greyscales will be the following:

1. Locate 36 registration points on the 1:1,000,000 scale LANDSAT transparency,

2. Digitize the points obtained in step 1 with the transparency overlayed on the USGS index map,

3. Use the map indexes obtained in step 2 to locate the appropriate 7½ minute USGS quadrangle maps,

4. Select precision control points on the 1:250,000 scale LANDSAT photo (B&W) and the 7½ maps,

5. Digitize the precision control points,

6. Evaluate the 3rd order polynomial using the file of corresponding points, and

7. Correct errors in the corresponding points file and then output the final file of polynomial coefficients.

Figures 1 and 2 chart the primary steps involved in registration of each LANDSAT scene. Figure 1 gives the steps necessary when greyscales are used whereas Figure 2 charts the case without greyscales. The numbers above the connecting lines refer to the number of person hours necessary to accomplish each table. The i,j number pair above each task denotes the expected event time, i, and the latest event time, j. That is, we would expect a task to be completed after i hours, but, in order not to delay the registration time it must be completed within j hours. Finally, the number within the box below the connecting lines gives the number of slack hours for that task. In other words, if not completed within the expected time, this would indicate the number of hours delay in this task for which no delay would occur for registering that scene.

Scene Registration Tasks for
The Materials Handling Group
Person in charge: Sandy Stutson

TASKS	PRINCIPAL PERSON(S)	ASSISTANCE
Map Filing and Record Keeping	T. Fisher	Pearl Jackson Lillian Schwartz
Point Digitization	Archie Nesbit Eric Hendry	George Harrell Sandy Stutson
Point Selection (grey-scales and Photos)	T. Fisher Sandy Stutson	

Fig. 1. Network Diagram for LANDSAT Scene Registration: With Greyscales

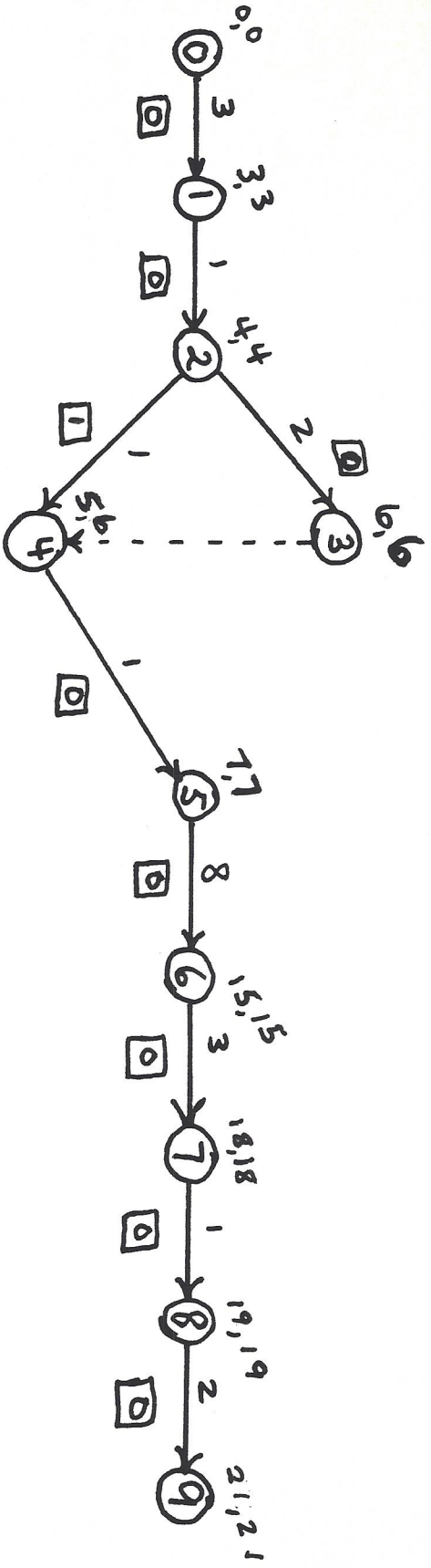

Fig. 2. Network Diagram for LANDSAT Scene Registration Without Greyscales