120969

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Steps Currently Recommended for a "Standard" Classification Task

1. Review task with appropriate Program Leader and/or Team Leader. Define objectives and categories of material to be classified.

2. Prepare "Research Project Description", putting this in the format described for Steps 1 - 5 of a Documentation Package. (see attachment 1) (Thus, the first page or two of the documentation package will be finished.) Copies of this should be distributed to all persons working on the project, as well as being routed to Program Leaders and Associate Program Leaders.

3. Run grey-scale printouts in at least 2 wavelength bands. The 0.62-0.66 and 0.80-1.0μm bands have proven to be reasonably satisfactory as a starting point for many past analyses. The choice of single versus double width printouts is largely a function of altitude above terrain at which the data was collected and size of the objects to be classified. Generally, for agricultural situations, single width printouts are satisfactory for data obtained below 3000 feet, but double width are required for data collected at higher altitudes.

4. Make acetate overlay. Obtain acetate and grease pencils from Debbie Remsburg and overlay grey-scale printout. Use blue grease pencil for marking roads and cultural features, red for field boundaries, green for cover type, and black for field number or designation. Mark edges and corners of scanner data on acetate (for future re-orientation purposes). Mark all obvious field boundaries. Switch to other wavelength band and mark in additional boundaries. Use aerial photos and CRT imagery ( if available) for remaining boundary determinations. Use ground truth photos to obtain ground cover designations and field number designations and mark these on acetate. Use 70mm color IR photos flown at time of mission (if available) to obtain additional ground truth data, particularly for land-locked fields in the centers of sections where ground truth couldn't be obtained from the road.

5. Obtain deck of field boundary cards. Use LARS Form 12 (attachment 2) and define boundaries of as many fields as possible. For "Field Designation" use an abbreviation for type of ground cover (a list of symbols for this purpose will normally be provided by the Support Programs people) and the number of the first line of data in the field, e.g. Wh - 2185. The lines and samples defined are inclusive (if the first line is defined as 954, that line of data will be included within the field area). In "Field Type", put code of ground cover as found on ground truth photos, which are according to ground truth instruction sheets for that mission. Under "Additional Information", put field number and any other information available about that field.

   Make sure your boundaries are well within the field (perhaps 2 rows or columns from edge). If there are obvious major shifts in tone within the field (such as a ponded area in corn or soybean fields), move your sample area so as not to include the non-uniformity. (Inclusion of such situations would result in bi-modal histograms, and could in effect be training the computer to recognize a weed patch as "corn" for example. Have field boundary cards punched up by night computer operator or Sue Schwartz(if work load permits).

6. Check field boundaries by running a couple of grey-scale printouts on LARSPLAY and delineating field boundaries. Correct any that show non-uniformities within the field.

7. Start using LARSYSAA; first, to check uniformity of all candidate fields (all field boundary cards). Obtain histograms in 6 bands and multispectral response graphs for all potential classes of ground cover (such as light colored bare soil and dark colored bare soil classes, harvested and unharvested corn classes, etc.). Review output, and for all potential classes that do not have unimodal histograms, obtain histograms and multispectral response graphs for individual fields.

8. Attempt to Define unimodal training classes. Correct and/or put aside all non-uniformly histogrammed fields (for later use as test fields). Study histograms and try to group fields with similar spectral response together. Each such group (or class) should have at least 3-4 fields, if possible, and each field representing rougly the same number of R.S.U.'s (perhaps 300 - 700 RSU's per field). Use $SELECT, treating each field as a separate class, to group similar fields. For this, ask for the best combination of 11 bands in $SELECT. If two fields have a low divergence on these tables, they are very similar and can be grouped. The use of the typewriter input "DIV/VALUE", using values of 10 - 30, or possibly 40, can also be very effective for this work.

9. Check statistics of candidate classes by running histograms and $SELECT for each class. Define manner in which classes (such as Corn 1, Corn 2, Corn 3) can be grouped into meaningful categories (such as Corn).

10. Carefully study $SELECT, and determine the number of channels and best combination of channels to use for the classification.

11. Run a per field classification on all training sample fields. Modify training sample decks if necessary. Run per field classification on test sample fields. If a large number are completely misclassified into another category (not simply another class), you've got troubles and had better go back and redefine classes (perhaps adding some classes). You could also run a classification of individual RSU's of the training or test fields alone (rather than the entire flight line area), to examine the spatial distribution of the classification results and to compare the "per field" classification results to the regular, individual RSU classification results.

12. Run LARSYSAA, using $CLASSIFY and $DISPLAY. In the display, ask for per class tables, first showing the individual classes. Then, if necessary, group appropriate classes (such as Corn 1, Corn 2, Corn 3) into their respective categories (such as Corn) and run display and table again. Do this for both training and test fields. This will offer insight as to separability of individual classes and separability of meaningful categories, as well as the capability to extrapolate from small training areas to larger test area. Use overlay on top of classification map

to examine accuracy of results.

13. Examine individual field classification tables (both class and category tables). If necessary, modify training decks and rerun classification.

14. When you think results are satisfactory and objectives have been achieved, complete the documentation package in draft form. Discuss results at next group or team meeting; modify write-up if necessary do additional analysis if necessary; and have final documentation package typed and distributed.