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Supporting Research

"AS-BUILT:" DESIGN SPECIFICATION FOR MISMAP

(E82-10091) AS-BUILT DESIGN SPECIFICATION FOR MISMAP (Lockheed Engineering and Management) 71 p HC A04/MP A01 CSCL 02C N82-21643

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"AS-BUILT" DESIGN SPECIFICATION
FOR MISMAP

Job Order 71-308

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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HOUSTON, TEXAS

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LEMSCO-16300
This document is the "As-Built" Design Specification for the MISHAP program which is part of the CLASFYT package.

The program is designed to compare classification values with ground truth values for a segment and produce a comparison map and summary table.
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</table>
MISMAP

1.0 SCOPE

This document contains the description of the implementation of the MISMAP program. The purposes of the program are as follows:

(1) To compare classified pixel values for a segment with corresponding ground truth values.

(2) To produce a comparison map which shows either where the two values agree or indicates the manner of disagreement.

(3) To produce a summary table with the percentage of the scene in each category.
2.0 APPLICABLE DOCUMENTS

The following documents form a part of this specification: AD 63-2457-3308-1 Transferring Badhwar Software.
AD NAS 9-15200 Technical Memorandum Format Specification for LACIE (Phase III) and Accuracy Assessment Computer Data Products.
3.0 SYSTEM DESCRIPTION

3.1 MISMAP PROCESSOR SYSTEM FLOWCHART

The system level data flow diagram for MISMAP is shown in Figure 3.1.

3.2 HARDWARE DESCRIPTION

The MISMAP program operates on the IBM 3031 computer at Purdue, LARS.

3.3 SOFTWARE DESCRIPTION

The MISMAP program is designed to compare the classification results of CLASFYT or other classifiers with ground truth data and produce a comparison "map" via the line printer and summary information which describes the degree of agreement or disagreement of the classifier and ground truth.

Classification data is input to MISMAP via a universally formatted file which contains pixel level codes. Refer to section 3.4.1 for a more detailed description of this file.

Ground truth data is input to MISMAP via a universally formatted file which contains sub-pixel level ground truth codes corresponding to various ground truth classes. There are six sub-pixels of ground truth for each pixel; two sub-pixels across the tree sub-pixels down. Therefore, 3 lines in a sub-pixel image correspond to 1 line in a sub-pixel image.

Refer to section 3.4.2 for a more detailed description of this file.

Majority Rule Code

MISMAP compares the classification and ground truth data at the pixel level and therefore ground truth labels must be assigned to the pixels. In order to do this a concept called "pixel purity" is introduced. The purity of a pixel is defined to be the largest number of sub-pixels in that pixel having the same ground truth code. The purity can range from 6 (i.e. pure), where all the sub-pixels have the same code, to 1 where each of the sub-pixels has a different code.
Figure 3.1 MISMAP Processor System Flowchart
A code, called the "Majority Rule Code" is assigned to each pixel whose purity is within a given, user-defined range. The code assigned is the ground truth code associated with the majority of the six ground truth sub pixels. When two or more ground truth codes are equally distributed among the six pixels, the first of these is assigned to the pixel. If the purity of the pixel is not within the specified range, no majority rule code is assigned.

Ground Truth and Classification Transformation

In order to compare the ground truth and classification data, each of the classification codes is transformed into one of six "Classification Categories" and each of the majority rule codes is transformed into one of six "Ground Truth Categories". The object of this is to reduce the total number of codes and to allow the combining of codes. For example, if one was interested in only "small grains" and "other", one might transform all the "small grains" codes into category 1 and all the "other" codes into category 2 for both the classification and ground truth data. The transformation to classification categories and ground truth categories is determined by user defined classification transformations and ground truth transformations (see section (3.4.3).

Some final points to note about the transformations:

1. If the category code is less than 1 or greater than 6, then the program will assign the value 6 (6 is usually reserved in MISMAP for unknown crop type).

2. If any of the codes between 1 and 255 are not assigned a category, then the program will assign a value of 6 as the category.
MISMAP Output and the Character Definition Matrix

As described above, each pixel having a purity within the specified purity range has two numbers associated with it, namely a classification category and a ground truth category. MISMAP outputs a line printer pixel level image composed of characters which indicate what these two numbers are for each pixel. The characters are specified by a user-defined "Character Definition Matrix" (see section 3.4.3) which specifies a particular character to represent each of the 36 combinations of the 6 classification categories and the 6 ground truth categories. On the output any pixel which was not in the specified purity range is represented by the character "?" so it would be inappropriate to choose this character for any of the positions in the character definition matrix.

3.4 FILE DESCRIPTIONS

3.4.1 INPUT DATA FILE CLASSIFICATION FILE

The Classification File output by CLASFYT and input to MISMAP is described here. For a complete description of the universal imagery file format refer to the Earth Resources Data Format Control Book, Volume 1. PHØ-TR543.

MISMAP requires a universally formatted classification file with the following characteristics:

1. A header record consisting of 3060 bytes followed by:
2. One hundred seventeen data records consisting of 360 bytes each.

<table>
<thead>
<tr>
<th>Record</th>
<th>Type</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HEADER</td>
<td>Bytes 1-60 Computing Systems I.D.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bytes 2249-2285 Acquisitions used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bytes 2760-2789 PFC Job Ident.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bytes 2941-3000 User supplied data.</td>
</tr>
</tbody>
</table>
### Record Type Contents

<table>
<thead>
<tr>
<th>Record</th>
<th>Type</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-118</td>
<td>Data</td>
<td>Bytes 1-72 Ancillary data (ignored by MISMAP).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bytes 73-268 Classification data for 196 pixels (1/Byte).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bytes 269-360 Bytes of zero fill.</td>
</tr>
</tbody>
</table>

#### 3.4.2 INPUT DATA FILE GROUND TRUTH FILE

The Ground Truth File input to MISMAP is described here. For a complete description of the universal imagery file format refer to the Earth Resources Data Format Control Book, Volume 1 PH0-TR543.

MISMAP requires a universally formatted ground truth file with the following characteristics:

1. A header record consisting of 3060 bytes followed by:

2. 351 records consisting of 540 bytes.

### Record Type Contents

<table>
<thead>
<tr>
<th>Record</th>
<th>Type</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Header</td>
<td>Bytes 1-60 Computing System I.D.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bytes 2249-2285 Acquisitions used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bytes 2760-2789 PFC job Ident.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bytes 2941-3000 User supplied data</td>
</tr>
<tr>
<td>2-352</td>
<td>Data</td>
<td>Bytes 1-72 Ancillary data (ignored by MISMAP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bytes 73-464 Ground truth crop codes which have been biased with-128 and stored as 8-bit two's-complement notation. (1 sub-pixel/byte).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bytes 465-540 Unused by MISMAP (must be present).</td>
</tr>
</tbody>
</table>
### Character Definition Matrix

<table>
<thead>
<tr>
<th>GROUND TRUTH CATEGORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1- -2- -3- -4- -5- -6-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>-1-</th>
<th>C</th>
<th>$</th>
<th>#</th>
<th>#</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2-</td>
<td>-</td>
<td>%</td>
<td>#</td>
<td>#</td>
<td>#</td>
</tr>
<tr>
<td>CLASSIFICATION</td>
<td>-3-</td>
<td>T</td>
<td>T</td>
<td>#</td>
<td>#</td>
</tr>
<tr>
<td>CATEGORY</td>
<td>-4-</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
</tr>
<tr>
<td>-5-</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
</tr>
<tr>
<td>-6-</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
</tr>
</tbody>
</table>

**Figure 3.2** Examples of Character Definition Matrix for Classification and Ground Truth Categories

---

### Classification Transformations

<table>
<thead>
<tr>
<th>1 TO 14</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 TO 15</td>
<td>3</td>
</tr>
<tr>
<td>16 TO 99</td>
<td>6</td>
</tr>
<tr>
<td>100 TO 199</td>
<td>2</td>
</tr>
<tr>
<td>200 TO 206</td>
<td>6</td>
</tr>
<tr>
<td>207 TO 207</td>
<td>2</td>
</tr>
<tr>
<td>208 TO 238</td>
<td>6</td>
</tr>
<tr>
<td>239 TO 239</td>
<td>1</td>
</tr>
<tr>
<td>240 TO 255</td>
<td>6</td>
</tr>
</tbody>
</table>

### Ground Truth Transformations

<table>
<thead>
<tr>
<th>1 TO 10</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 TO 79</td>
<td>2</td>
</tr>
<tr>
<td>80 TO 80</td>
<td>3</td>
</tr>
<tr>
<td>81 TO 91</td>
<td>2</td>
</tr>
<tr>
<td>92 TO 92</td>
<td>1</td>
</tr>
<tr>
<td>93 TO 116</td>
<td>2</td>
</tr>
<tr>
<td>117 TO 117</td>
<td>1</td>
</tr>
<tr>
<td>118 TO 163</td>
<td>2</td>
</tr>
<tr>
<td>164 TO 164</td>
<td>3</td>
</tr>
<tr>
<td>165 TO 255</td>
<td>2</td>
</tr>
</tbody>
</table>

**Figure 3.3** Examples of Classification and Ground Truth Transformations
3.4.3 USER DEFINED FILE (SYMBOL FILENAME) (SYMBOL FILETYPE) A

This file is used to specify (1) the pixel purity range, (2) the character
definition matrix, (3) the ground truth transformations, (4) the classification
transformations, and (5) a skip factor.

A typical character definition matrix is shown in figure 3.2. The lines
correspond to classification categories and the columns to ground truth
categories. In the example shown a pixel which had a classification
category of 1 and a ground truth category of 2 would be represented on the
output map by the symbol + .

Typical ground truth and classification transformations are shown in figure
3.3. Each transformation gives a range of codes and the category they are
to be transformed into.

The skip flag is normally set to zero. However sometimes there are 50
color records following the header record of the classification file. In
this case the skip flag must be set to some non zero number. The 50 records
are then read into a dummy variable before the first data record is
processed.

The symbol file may be a permanent or temporary "card image" file and must
have the following form.
<table>
<thead>
<tr>
<th>Record</th>
<th>Columns</th>
<th>Format</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>I1</td>
<td>Lower limit of pixel purity range.</td>
</tr>
<tr>
<td>2</td>
<td>1X</td>
<td></td>
<td>Ignored.</td>
</tr>
<tr>
<td>3</td>
<td>I1</td>
<td></td>
<td>Upper limit of pixel purity range.</td>
</tr>
<tr>
<td>2</td>
<td>1-6</td>
<td>6A1</td>
<td>Character definition matrix, row 1.</td>
</tr>
<tr>
<td>3</td>
<td>1-6</td>
<td>6A1</td>
<td>Character definition matrix, row 2.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1-6</td>
<td>6A1</td>
<td>Character definition matrix, row 6. (last row).</td>
</tr>
<tr>
<td>8</td>
<td>1-5</td>
<td>I5</td>
<td>Lower limit of majority rule code range.</td>
</tr>
<tr>
<td></td>
<td>6-10</td>
<td>I5</td>
<td>Upper limit of majority rule code range.</td>
</tr>
<tr>
<td></td>
<td>11-15</td>
<td>I5</td>
<td>Ground truth category for the described range.</td>
</tr>
<tr>
<td>9-M</td>
<td>1-15</td>
<td>3I5</td>
<td>As many records as are required, in the same format as record 8, to describe the ground truth transformations.</td>
</tr>
<tr>
<td>M+1</td>
<td>1-15</td>
<td>3I5</td>
<td>Three zeros, right adjusted, indicating the end of ground truth transformation records.</td>
</tr>
<tr>
<td>M+2 to N</td>
<td>1-15</td>
<td>3I5</td>
<td>Records describing the classification transformations. Format is identical to records 8 to M+1.</td>
</tr>
<tr>
<td>Record</td>
<td>Column</td>
<td>Format</td>
<td>Content</td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>N+1</td>
<td>1-15</td>
<td>315</td>
<td>Three zeros, right adjusted, indicating the end of classification transformation records.</td>
</tr>
<tr>
<td>N+2</td>
<td>1</td>
<td>I1</td>
<td>Skip factor. If nonzero, color records are assumed to precede the classification file data and are skipped. If no color records are present this field must be set to zero.</td>
</tr>
</tbody>
</table>

**Default values for Ground Truth and Classification Transformations**

A default category code of 6 is automatically assigned if a classification code or majority rule code is not included in any transformation. In addition, a transformation code of less than 1 or greater than 6 is changed to 6.

The following is an annotated listing of a SYMBOL file example:

**Example**

**FILE: SYMBOL CORN A (file name)**

1 6   (Low, high range of pixel purity)
C+### character definition matrix
- ###
TT###
#####
#####
1 10 1
11 79 2
92 92 1
81 91 2 Ground truth
93 116 2 Transformation records
117 117 1
118 163 2
164 164 3
165 165 2
0 0 0 End of ground truth transformation records

3-8
Classification transformation records.

End of classification transformation records.

Color record skip indicator.

3.4.4 USER DEFINED FILE -- MSMP CC A

The user information file "MSMP" is optional, and its contents are printed in the header for informational purposes only. The contents could identify the run by analyst name, date, acquisition numbers, or other appropriate comments. The information in MSMP is entered in free field card image format and as many card images as necessary may be used. For an example, see the input summary in the output in Appendix B.
3.5 DETAILED SOFTWARE DESCRIPTION

3.5.1 MISMAP PROGRAM

Purpose

MISMAP compares the results of CLASFYT or other classifiers with ground truth data and produces a comparison "map" and summary information which describes the degree of agreement or disagreement of the classifier and ground truth.

Linkages

MISMAP calls MSMP.

Interface

Calling sequence:

Not applicable. (A description of MISMAP EXEC which loads and executes MISMAP can be found in Section 4.0).

Calling sequence parameters:

Not applicable.

Function value:

Not applicable.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.
### Inputs

<table>
<thead>
<tr>
<th>Unit</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td></td>
<td>Universal formatted ground truth file.</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Universal formatted classification file.</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td>Symbol file.</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>Card control file.</td>
</tr>
</tbody>
</table>

### Outputs

<table>
<thead>
<tr>
<th>Unit</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Terminal</td>
<td>Runtime errors.</td>
</tr>
<tr>
<td>6</td>
<td>Printer</td>
<td>Program report.</td>
</tr>
</tbody>
</table>

### Storage requirement

Not applicable.

### Description

MISMAP first reads the following information from the "Symbol" file:

1. The range of pixel purity which is used for the majority rule for pixels.
2. The character definition matrix which contains the symbols printed in the map.
3. The ground truth classification transformations.
4. The color record skip factor.

Next MISMAP calls the subroutine MSMP (reference 3.5.2) to read the optional user information file (3.4.1) and print it as an "input summary" at the top of the Comparison Map.
Next MISMAP prints the following header information from the Symbol file:

1. Character definition matrix.
2. Pixel purity range.
4. Classification transformations.

Continuing, MISMAP reads the header records and prints for each input file the following information:

1. Computing system ID.
2. Acquisitions used.
3. User supplied data (from header record).
4. The segment number.

The skip factor is read and since color records are not needed, they are read into a dummy variable if they are present.

Next the main part of MISMAP is executed for each of the 117 lines of the scene. It does the following:

1. Reads a line Classification data.
2. Reads a line of the Ground Truth data.
3. Transforms the classification value and ground truth value for each pixel to pair of codes (each between 1 and 6) representing the particular crop. It uses these codes as indices to the 6x6 character definition matrix to determine the appropriate map symbol.
4. Keeps a count of the number of times each symbol occurs.
5. Prints the line of symbols on the comparison map.

Finally, MISMAP computes the percentages of pixels in each category and the percentage of the scene in which disagreement occurred between the two files.
Flowchart
Not applicable.

Listing
See Appendix A for program listing.
J.5.2 SOFTWARE COMPONENT NO. 1 (MSMP)

Purpose
The MSMP subroutine prints the user information file in the heading for the report.

Linkages
MSMP is called by MISMAP.
MSMP calls CPTIME, a library routine.

Interface
Calling sequence:
CALL MSMP.

Calling sequence parameters:
None.

Function value:
Not applicable.

Labeled COMMON parameters:
None.

Blank COMMON parameters:
None.

Inputs
<table>
<thead>
<tr>
<th>Unit</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Seq. data</td>
<td>Control card file (See Section 3.4.1).</td>
</tr>
</tbody>
</table>

Outputs
<table>
<thead>
<tr>
<th>Unit</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Printer</td>
<td>Program report.</td>
</tr>
</tbody>
</table>
Storage requirement
Not applicable.

Description
MSMP reads the user information file (optional on A disk) and prints the card images in the heading of the report.

Flowchart
Not applicable.

Listing
See Appendix A for routine listing.
4.0 OPERATION

4.1 OPERATING DESCRIPTION

MISMAP is operational on the IBM 3031 computer at LARS, West Lafayette, Indiana.

The MISMAP program is one of the programs of the BADHVAR SYSTEM which includes the programs CLASFYT, MISMAP, PARPLT, PARHIS, and PARCLS.

MISMAP requires the use of a D disk which is assigned as a temporary disk and an E disk which is used to temporarily store certain LARS routines. The user, therefore, must not assign a disk to his machine using either MODE E or MODE D. These disks will be assigned as needed.

Prior to executing the MISMAP program the user must (1) establish on his A disk a SYMBOL file as described in section 3.4.3 and (2) establish the optional USER INFORMATION file as described in section 3.4.4, if he wishes to use this file.

4.2 COMMANDS DESCRIPTION

To execute MISMAP the user will enter a series of commands which invoke the JOB CONTROL SOFTWARE. These commands are divided into two classes namely (1) FUNCTION commands and (2) PROGRAM commands. The FUNCTION commands, which perform all the functions except executing the program are reusable; i.e., once they are invoked they remain in effect until reentered. The PROGRAM commands, which execute the program, must be reentered each time the program is to be executed.

The following list gives the commands required to execute the MISMAP program. They are all FUNCTION commands except the PROGRAM command MISMAP. These commands must be given in the listed order except that the order of the DEFGTRU command and the DEFCLAS command may be interchanged.
START

DEFGTRU......

DEFCLAS......

MISMAP ......

END

The following sections describe each of the commands in detail. Input fields are separated by blanks. If more than one word is required to describe an input field, the descriptive text is enclosed in pointed brackets <>. If an input is optional the field is enclosed in square brackets []. Do not include these explanatory characters <> [] when actually submitting input to the computer. To enter a command the user types one input per defined input field and separates each field with a blank.

4.2.1 START

The START command spools the user's console file. The use of this command, along with the END command, will provide a listing of all information appearing on the user's console file. (If running an interactive job, this is the terminal; if running a batch job, this is a system defined device.) The START command is invoked by the user typing the following:

START

4.2.2 DEFGTRU

The DEFGTRU command defines a Ground Truth File. The user can use this command to define Ground Truth files on tape, disk, or the LARS RT&E Database. In the latter case a series of programs are invoked to provide interface with the data base. The following diagram illustrates this software flow.

..RTEERR (LARS ROUTINE)

DEFGTRU......GTRUINF....

..GTINFO (LARS ROUTINE)
For a detailed description of the above JOB CONTROL SOFTWARE see appendix B.

The DEFGTRU command has the following forms and is invoked by typing one of the following, according to the user's requirement.

If the file is on tape -

```
DEFGTRU TAPE# FILE# <TAPE DENSITY>
```

If the file is on disk -

```
DEFGTRU FILENAME FILETYPE FILEMODE
```

If the file is on the LARS Data Base -

```
DEFGTRU SEGMENT# YEAR
```

(year—last two digits of data generation year)

This command remains in effect for the use of any of the BADHWAR SYSTEM PROGRAM commands and does not have to be reissued unless the user wishes to redefine the input Ground Truth File.

4.2.3 DEFCLAS

The DEFCLAS command defines the input Classification or Cluster file. The user can use this command to define a Class or Cluster file on tape or disk. The DEFCLAS command has the following forms and is invoked by typing one of the following, according to the user's requirement.

If the file is on tape -

```
DEFCLAS TAPE# FILE# <FILE DENSITY>
```

If the file is on disk -

```
DEFCLAS FILENAME FILETYPE FILEMODE
```

This command remains in effect for the use of any of the BADHWAR SYSTEM PROGRAM commands and does not have to be reissued unless the user wishes to redefine the input Classification or Cluster File.

4.2.4 MISMAP

The MISMAP command is a PROGRAM command and is used to invoke the execution of the MISMAP program. This command must not be used unless the DEFCLAS
and the DEFGTRU FUNCTION commands have been previously issued. Also, as previously stated the user must have established a SYMBOL FILE on his A disk before invoking this command. The MISMAP command is invoked by the user typing the following:

MISMAP <SYMBOL FILENAME> <SYMBOL FILETYPE>

The output from the MISMAP program is spooled to the HOUSTON line printer. The output consists of a MAP and the USER INFORMATION file if this file was defined.

4.2.5 END

This command closes the user's console file and causes a spooled copy to be sent to the HOUSTON printer. This command has no effect if the START command was not previously issued. The END command is invoked by the user typing the following:

END

4.3 OPERATING EXAMPLE

For our example we will assume the following:

The symbol file is established on the user's A disk under the file description:

0882 79082 A

The user has two different Classification files which he wishes to input to the MISMAP PROGRAM. He will therefore, issue two PROGRAM commands in his command sequence.

Furthermore, the user has selected to use a ground truth file at LARS.

<table>
<thead>
<tr>
<th>COMMAND</th>
<th>EXPLANATION OR ACTION TAKEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>START</td>
<td>Spools the console file.</td>
</tr>
<tr>
<td>DEFGTRU 882 79</td>
<td>Defines a ground truth file using data from the LARS Data Base.</td>
</tr>
<tr>
<td>DEFCLAS 088279 079 B</td>
<td>Defines a Class file on the users B disk. This data is on a disk which the user has previously attached to his disk using a B mode.</td>
</tr>
</tbody>
</table>
MISMAP 0882 79082

Executes the MISMAP PROGRAM.

DEFCLAS 2345 23 1600

Redefines the class file. This file is from a 1600 BPI tape.

MISMAP 0882 79082

Executes the MISMAP PROGRAM. The user has chosen to define his symbol file the same as in the previous execution of MISMAP.

END

Closes the user's console file and spools the file to the HOUSTON printer.
APPENDIX A
MISMATCH PROGRAM LISTINGS
PROGRAM DEVELOPED BY J. CARDOSO, 1/19/70, MODIFIED FOR IBM CMS
BY P. HAMPTON, 1/30/70.

PROGRAM - PROGRAM AGRODEF (A=0,..,6)

DATA RECORDS

0 = DATA RECORD
1 = DELETION RECORD
2 = UPDATE RECORD
3 = EXTENSION RECORD
4 = RECORD IDENTIFIER

DATA RECORD - (A=0,..,6)

DATA RECORD IDENTIFIER

DATA RECORD DELETION

DATA RECORD UPDATE

DATA RECORD EXTENSION

DATA RECORD IDENTIFIER

DATA RECORD IDENTIFIER

DATA RECORD IDENTIFIER

DATA RECORD IDENTIFIER

DATA RECORD IDENTIFIER

DATA RECORD IDENTIFIER

DATA RECORD IDENTIFIER

DATA RECORD IDENTIFIER

DATA RECORD IDENTIFIER
CHECK TO SET IF TAPES ARE FOR SAME SEGMENT

IF KLASEG. EN COURSES TO 1019

1019 FORMAT [1 | SEGMENT NUMBERS]

919 FORMAT [11 | SUPPLIED DATA = 1,000]

CLEAN SIMMING ARRAY.

PRODUCE COMPARISON MAP FROM DATA 10 IMAGE FILES, PASS 1 IS FOR
LEFT SIDE OF SEGMENT, PASS 2 IS FOR RIGHT SIDE OF SEGMENT

WRITE HEADING FOR MAP

WRITE (0,919) PASS, KLASEG, NAME OF COMPARISON MAP OF SEGMENT NUMBERS.

WRITE (0,918) KLASEG, NAME OF COMPARISON MAP OF SEGMENT NUMBERS.

WRITE (0,917) KLASEG, NAME OF COMPARISON MAP OF SEGMENT NUMBERS.

READ HEAD, READER, DUMMY

READ COLOR RECORDS IF SKIP FLAG IS SET.

IF (REPORT > 0) GO TO 117

HEAD (7,944) DUMMY

HEAD THROUGH IMAGES ONE LINE AT A TIME FOR CLASSIFICATION FILE
AND THREAT LINES AT A TIME FOR THE GROUND TRUTH FILE.

WRITE (0,942) (DUMMY(1) = 1,117)

WRITE CLASSIFICATION FILE.

THE FIRST 15 BYTES (72) IN THE NAME OF THE PHYSICAL RECORD AND
AMPB THE LAST 15 BYTES OF THE NAME OF THE RECORD PLUS AN
ADJUSTMENT TO A MULTIPLE OF 15.

WRITE (0,942) (DUMMY(1) = 1,130)
IF (PASS,0.1) WRITE (6,927) J=1,60, RTOPT(1)
   DO 1084 J=1,6
   RSUM(J) = RSUM(J)+RTOPT(J)*100./RTOT
   RTOT(1) = RTOT(1)*100./RTOT
C
   WRITE PERCENTAGES AND SUM OF THEM FOR 3RD CLASSIFICATION CATEGORIE.
   DO 1090 J=1,6
   WTP(J) = WTP(J)+RSUM(J)*100./RTOT
C
   WRITE TOTAL PERCENTAGES FOR 4TH, 5TH, 6TH CLASSIFICATION CATEGORIE.
   DO 1106 J=1,6
   WTTP(J) = WTTP(J)+WTP(J)
C
   CALCULATE TOTAL PERCENTAGES FOR 6 GROUND TRUTH CATEGORIES
   DO 1122 J=1,6
   WTTP(J) = WTTP(J)+WTP(J)

1084    CONTINUE
1090    CONTINUE
1106    CONTINUE
1122    CONTINUE
### FORTRAN CROSS REFERENCE LISTING

**SYMBOL INTERNAL STATEMENT NUMBERS**

<table>
<thead>
<tr>
<th>MOD</th>
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<tbody>
<tr>
<td>INDAY</td>
<td>0000 0004 0006 0032</td>
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<tr>
<td>INDP</td>
<td>0000 0003 0004 0040</td>
</tr>
<tr>
<td>INPM</td>
<td>0000 0002 0004 0010 0014 0016 0000 0010 0001 0002 0003 0004 0005</td>
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<tr>
<td>IYPM</td>
<td>0037 0037</td>
</tr>
<tr>
<td>INVA</td>
<td>0000 0000 0006 0008 0010 0012 0014 0008 0010 0012 0014 0016 0018 0020 0022 0024 0026 0028 0030 0032 0033 0035 0036 0036</td>
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<tr>
<td>JULIAN</td>
<td>0000 0002</td>
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**LABEL DEFINED REFERENCES**

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<tr>
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<th>NAME</th>
<th>TAG</th>
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**SOURCE STATEMENT LABELS**

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*OPTIONS IN EFFECT* NAMEl(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTOCLASS(NONE)

*OPTIONS IN EFFECT* SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOTOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM ITM FLAG(T)

*STATISTICS* SOURCE STATEMENTS = 41, PROGRAM SIZE = 768, SUBPROGRAM NAME = JULIAN

*STATISTICS* NO DIAGNOSTICS GENERATED

++++ END OF LISTING ++++
OPTIONS IN EFFECT:

NAME (MAIN) OPTIMIZE(1) INCLUDE(SIZE) 604K NEWFILE

SOURCE STATEMENT LABELS

ISN 0002

COMPILER GENERATED LABELS

ISN 0003

FORMAT STATEMENT LABELS

ISN 0004

**** ORTHAN CROSS REFERENCE LISTING ****

LABEL OFFSET REFERENCES

ISN 0005

**** ORTHAN CROSS REFERENCE LISTING ****

NAME TAG TYPE ADD.

ISN 0007

** SIZE OF PROGRAM 000246 HEXADECIMAL BYTES

ISN 0009

SOURCE STATEMENT LABELS

ISN 0011

COMPILER GENERATED LABELS

ISN 0013

FORMAT STATEMENT LABELS

ISN 0015

ISN 0017

ISN 0019

ISN 0021

ISN 0023

ISN 0025

ISN 0027

ISN 0029

ISN 0031

ISN 0033

ISN 0035

ISN 0037

ISN 0039

ISN 0041

ISN 0043

ISN 0045

ISN 0047

ISN 0049
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FILE: DEFCLAS EXEC  H  LAHS / MOHUR UNIVERSITY

CONTROL OFF

DEFCLAS

HISTORY

M A TOMPINS  LEMSCO  02/04/81  ORIGINAL DJNE

PURPOSE

This exec is used to define classification/cluster files.

FILENAME FILETYPE FILEMODE OF CLASS FILE ON WRITTEN
ON A RECALL FILE UNIT 231 BY FORMAN ROUTINE FILWRT.
ARGUMENTS TO THE EXEC ARE AS FOLLOWS:

FOR SEGMENT ON DATA FILE:
FILENAME FILETYPE FILEMODE
FOR SEGMENT ON UNIT:
TAPER FILE# TapeDensity

FILE DEFINITION DESCRIPTION FOR ALL FILES USED IN THESE PROGRAMS
AND EACH ARE AS FOLLOWS:
UNIT  DESCRIPTION
1    TERMINAL: HEAD
4    LAHS MAINLINE
5    TERMINAL: WHITE LAHS ERROR NSG ROUTINE
7    MAINTAIN SYSTEM
9    MAINTAIN SYSTEM
11-19 CLASSIFICATION/CLUSTER FILE
21    MAINTAIN SYSTEM
22    MAINTAIN SYSTEM
23    RECALL FILE FOR CLASS FILE
24-24 MAINTAIN SYSTEM
30    +HEAD UNIT

NOTE: Those files used by maintain system can be used in this
program. This is just a warning that one should be careful before
doing so.

EXCEPTION

The following errors cause program termination:
  1. NO TEMPORARY DISK AVAILABLE.
  2. INSUFFICIENT PARAMETERS INPUT TO PROGRAM.
  3. ERROR IN ACCESSING LAHS DATA BASE.

PROCEDURE

ASSIGN A TEMP DISK, SPECIFY LIBRARIES

SPACE 1
LIBRARY DEFCLAS 41 & 42
GLOBAL TABLE ENGLISH FORM1,M02
CP UNIT VIRTUAL 1/4
LIB SWITCODE HE 0 (OUTdisk TEMP 1/2 CLEAN)
LIB SWITCODE HE 0 (TYPE W TEMP DISK ACCESSED).
LIB SWITCODE HE 0 (EXIT 1)

STACK UNIT NUMMEN AND FILEDEF RECALL UNIT
FILE: OFFGTHU EXEC  LANS / MURRUM UNIVERSITY

CONTROL OFF

OFFGTHU EXEC

HISTORY

M A TOMPKINS  LEMSUC  02/14/81  ORIGINAl CODE

PURPOSE

This EXEC executes a FURTHAN PHRHMTAN (GTRHINTF) which accesses
the LANS file data base for the desired ground truth tapes
GTRHINTF writes an EXEC (GTRHINTF) which transmits to this EXEC
the tapes files of tape that contains the requested segment.
In addition the FILENAME:FILENAME:FILENAME: and UNIT# are
are passed to PROGRAM FMTINT which writes this info to a file
defined to UNIT 22.

ARGUMENTS TO THE EXEC ARE AS FOLLOWS:

FOR SEGMENT ON DATA FILE:
FILENAME FILETYPE FILEMODE
FOR SEGMENT ON TAPE:
TAPE# FILE# TAPENESS
FOR SEGMENT AT DATA:
SEGMFT# YR (yr is the last 2 digits of the year of segment)

FILE DEFINITION DESCRIPTION FOR ALL FILES USED IN THESE PROGRAMS
AND EXEC ARE AS FOLLOWS:

UNIT  DESCRIPTION
1  TERMINAL HEAD
2  LANSヒッタン
3  TERMINAL; WRITE LANS ERHOR MSG ROUTINE
4  MAINMAIN SYSTEM
5  MAINMAIN SYSTEM
6  MAINMAIN SYSTEM
7  MAPDMAIN SYSTEM
8  MAPDMAIN SYSTEM
9  GROUND TRUTH FILES
10  MAPDMAIN SYSTEM
11-19  MAPDMAIN SYSTEM
20  MAPDMAIN SYSTEM
21  MAPDMAIN SYSTEM
22  MAPDMAIN TRUTH FILE INF
23  MAPDMAIN SYSTEM
24-24  MAPDMAIN SYSTEM
26  TERMINAL HEAD UNIT

NOTE: those files used by MAINMAIN SYSTEM CAN BE USED IN THIS
PROGRAM, THIS IS JUST A WARNING THAT ONE SHOULD BE CAREFUL BEFORE
DOING SO.

EXCEPTION

THE FOLLOWING ERRORS CAUSE PROGRAM TERMINATION:

1. NO TEMP DISK AVAILABLE
2. INCOMPLETE PARAMETER INPUT TO PROGRAM
3. NO INPUT NOT AS EXPECTED
4. ERROR IN ACCESSING LANS DATA BASE

PROCEDURE

ASSIGN A TEMP DISK, SPECIFY LIBRARIES

SPACE
LIMITEDEPTION A1 A2 A3
GLOBAL TAILING CALL IN SYSTEM
CP SPACE VIRTUAL 142
FILE: DEFGTWH EXEC

FILEDEF TERMINAL AND EXEC FILE WRITTEN DURING RUN.

FILEDEF 1 TERMINAL
FILEDEF 2 TERMINAL
FILEDEF FILEDOOR DISK UNINFO EXEC DI LHECL DU BLKSIZE 60 PEHM

* IF LENGTH OF L1 (SEGMENT NUMBER) < 0 CONCATENATE 0
* -LOOP LSEQLNG = LENGTH L1
* L1 = LCONCAT 0 L1
* GOTO -LOOP

* STACK INPUTS TO ALLOW GTUIINF TO ACCESS LAWS RT66 DATA BASE.
* GTUIINF WILL WRITE GTUNINFO EXEC TO ALLOW THE PASS THROUGH OF
* TAPE FILE.

4STACK L1
4STACK L2

LOAD GTUIINF STINFOH KTELEPH KCLEAR NOMAP START

LOAD EXEC WRITTEN BY PROGRAM.

EXEC GTUNINFO D
REL EDIT
READ VAMS TAPE
AHEAD VAMS FILE
A1 = AFILE
A2 = AFILE
A3 = 800
L1 = L1 L1 = A1 N AFILE - TAPE
EXIT
**LEVEL 2.3.0 (JUNE 7A)
MAIN
US/100 FURTHAN R EXTENDED
DATE 01/11/16,33,88
PAGE 6**

| FSM 0014 | 200 IF (UNIT, U, QUI T BY 400) |
| FSM 0018 | 210 FOMATTED (UNDEFINED, TRIM FILE IS UNDEFINED) |
| FSM 0019 | 220 FOMATTED (STACK 1) |

**HEAD FROM RECALL FILE FOR CLASSIFICATION DATA**

| FSM 0022 | 400 JUNIT = U |
| FSM 0023 | 410 FOMATTED (CLASSIFICATION FILE IS UNDEFINED) |
| FSM 0024 | 420 FOMATTED (CLASSIFICATION FILE IS UNDEFINED) |

**WHITE EXEC**

| FSM 0016 | WHITE (4+4) |
| FSM 0017 | WHITE (4+4) |
| FSM 0018 | WHITE (4+4) |
| FSM 0019 | WHITE (4+4) |

**SYMBOL INTERNAL STATEMENT NUMBERS**

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**FURTHAN CROSS REFERENCE LISTING**

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**SOURCE STATEMENT LABELS**

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**SIZE OF PROGRAM 0044C HEXDECIMAL BYTES**

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**ORIGINAL PAGE IS OF POOR QUALITY**
LEVEL 2.3.0 (JUNE 71)  MAIN  05/360 FORTRAN H EXTENDED  DATE 01.140/12.33.84  PAGE 3

COMPILER GENERATED LABELS

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FORMAT STATEMENT LABELS

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<td>410</td>
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<tr>
<td>420</td>
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*OPTIONS IN EFFECT* NAME (MAIN) OPTIMIZE(1) LIMCOUNT(8K) SIZE(MAX) AUTODIR(NONE)
*OPTIONS IN EFFECT* SOURCE ENCODIC NOLIST NODECK OBJECT MAP NFORMAT NOUNSIN XREF ALC NOUNSF NOUNHM IBM FLAG(I)
*STATISTICS* SOURCE STATEMENTS = 418, PROGRAM SIZE = 1100; SUBPROGRAM NAME = MAIN
*STATISTICS* NO DIAGNOSTICS GENERATED

***** END OF COMPILED *****

292K BYTES OF CORE NOT USED
PROGRAM FILE

WRITE INPUTS TO Undef/DefCLAS EXECS TO RECALL FILE.

METHOD

READ FROM INPUT OF Undef/DefCLAS Stack and OUTPUT TO FILE.

EXTERNAL REFERENCES

NONE.

EXTERNAL REFERENCES

NONE.

EXCEPTIONS

NONE.

LOCAL DECLARATIONS

INTEGER UNIT

LOGICAL UNIT NUMBER OF FILE 9=TRUTH 10=CLASS

INTEGER NAME(2)

FILENAME

INTEGER NAMETYPE(1)

FILENAME TYPE

INTEGER MODE

FILE MODE

PROCEDURE

READ FROM EXECS STACK

READ(1) OUTPUT UNIT

100 PRINT(1)(2)

READ(1),INPUT(NAMC(1)=1+2)

150 FORMAT(2,4X)

READ(1),INPUT(NAMC(1)=1+2)

WRITE OUTPUT UNIT(2)

200 FORMAT(1)

WHITE FILES

IF (UNIT,4,9,90=(*2,100)) UNIT,(NAMC(1)=1+2)

IF (UNIT,4,9,10=(*2,100)) UNIT,(NAMC(1)=1+2)

300 FORMAT(1,3,3,4+2,2)

iffany
PROGRAM GTTRUN

GET GROUND TRUTH INFO FROM LARS DATA BASE

METHOD

READ NUMBER OF AGCS, SEGMENT NUMBER AND LAST TWO DIGITS OF SEG. EXEC.
ACCESS THE LARS RT&E DATA BASE. IF SUCCESSFUL WRITE GTTRUN INFO
TO TRANSMIT TO THE TAPE FILES TO THE DFO TRU EXEC.

EXTERNAL REFERENCES

GTINFO LARS ROUTINE TO ACQUIRE INFO FROM LARS RT&E DATA BASE
RTERR LARS ERROR MESSAGE ROUTINE

EXCEPTIONS

IF IERR <> 0 OR 4 WRITE ERROR MESSAGE AND WRITE EXEC
TO TERMINATE PROGRAM.

LOCAL DECLARATIONS

INTEGER INDEX(9,64)
INFO ON GROUND TRUTH TAPES
INTEGER IYR
LAST 2 DIGITS OF YEAR OF GROUND TRUTH
INTEGER IERR
LARS ERROR FLAG
INTEGER ISEGNO
SEGMENT NUMBER
INTEGER IDUMMY(64)
ARG THAT DOESN'T PERTAIN TO THIS APPLICA-
TION OF LARS STANDARD ROUTINE PARAMETERS

PROCEDURE

READ FROM CONSOLE STACK USER INPUTS, START WRITING EXEC

CALL LARS ROUTINE FOR INFO.

CALL GTINFO(ISEGNO,IYR,IDUMMY,INDEX,IERR,4,4)

CHECK FOR ERROR

IF(IERR.EQ.0.OR.IERR.EQ.4) GO TO 160
CALL RTERR(IERR,4)

ISN 0002 C INTEGER INDEX(9,64) INFO ON GROUND TRUTH TAPES
ISN 0003 C INTEGER IYR LAST 2 DIGITS OF YEAR OF GROUND TRUTH
ISN 0004 C INTEGER IERR LARS ERROR FLAG
ISN 0005 C INTEGER ISEGNO SEGMENT NUMBER
ISN 0006 C INTEGER IDUMMY(64) ARG THAT DOESN'T PERTAIN TO THIS APPLICA-
TION OF LARS STANDARD ROUTINE PARAMETERS

ISN 0007 WRITE(1,100) WRITE(1,100)
ISN 0008 C 100 FORMAT(1L CONTROL OFF!)
ISN 0009 C READ(3) 110 ISEGNO
ISN 0010 C 110 FORMAT(14)
ISN 0011 C READ(3) 201 IYR
ISN 0012 C 120 FORMAT(14)
ISN 0013 CALL LARS ROUTINE FOR INFO.
ISN 0014 CALL GTINFO(ISEGNO,IYR,IDUMMY,INDEX,IERR,4,4)
ISN 0015 CHECK FOR ERROR
ISN 0016 IF(IERR.EQ.0.OR.IERR.EQ.4) GO TO 160
ISN 0017 CALL RTERR(IERR,4)
## COMPARISON MAP OF CLASSIFICATION RESULTS WITH GROUND TRUTH

### GROUND TRUTH FILE: 12374365
### CLASSIFICATION FILE: 12341064

#### CHARACTER DEFINITION MATRIX

<table>
<thead>
<tr>
<th>GROUND TRUTH CATEGORIES</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<tbody>
<tr>
<td>Classification Categories</td>
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#### PIXEL PURITY RANGE - FROM 1 TO 10 SUBPIXELS

### GROUND TRUTH TRANSFORMATIONS

| 1 | 10 = 1 |
| 11 | 20 = 2 |
| 21 | 30 = 3 |
| 31 | 40 = 4 |
| 41 | 50 = 5 |
| 51 | 60 = 6 |
| 61 | 70 = 7 |
| 71 | 80 = 8 |
| 81 | 90 = 9 |
| 91 | 100 = 10 |

### CLASSIFICATION TRANSFORMATIONS

| 1 | 6 = 1 |
| 15 | 15 = 2 |
| 24 | 24 = 3 |
| 33 | 33 = 4 |
| 42 | 42 = 5 |
| 51 | 51 = 6 |
| 60 | 60 = 7 |
| 69 | 69 = 8 |
| 78 | 78 = 9 |
| 87 | 87 = 10 |

---

**HEADER INFORMATION FOR GROUND TRUTH FILE:**

12374365

**COMPUTING SYSTEM ID:** PDV-114/45

**ACQUISITIONS USED:**

**PRF JOB INIT:**

**USER SUPPLIED DATA:** IF-1474-CIR-4D-LINE4-AH10-LINE4-1-1F-2

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**HEADER INFORMATION FOR CLASS FILE:**

12341064

**COMPUTING SYSTEM ID:** SW MULTI TEMP CLASSIFIER FROM CLASFTG
ORIGINAL PAGE IS OF POOR QUALITY
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PERCENTAGE OF SCENE MISCLASSIFIED = 27.4