



INTERNATIONAL ATOMIC ENERGY AGENCY  
UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION



**INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS**  
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CABLE: CENTRATOM - TELEX 460392-I

SMR/107 - 15

WORKSHOP ON PATTERN RECOGNITION AND ANALYSIS OF SEISMICITY

(5 - 16 December 1983)

E X E R C I S E S

on the computer terminal

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These are preliminary lecture notes, intended only for distribution to participants.  
Missing copies are available from Room 230.



[illegible]

- ## GENERAL OPERATIONS

—

(in any order)

The result of each exercise is a table. Call it on the screen (type).

Print nothing until all exercises are done.

- You will check the result in the next two exercises.

II. For the catalog CICTP (see exercise I) generate Table 3 - the list of all earthquakes with  $MC \geq 7$ . Use the program SUBCAT and the silence file SICTP.

III. For the catalog DICTP generate Table 4 - the distribution of MC for each year through 1930-1980. Processing of magnitudes is the same as in the exercise I. Non-overlapping magnitude intervals: interval = shift = I.

Use DISTR and the silence file DSWP.

IV. For the catalog CICTP generate Table 5 - the list of the main shocks with statistics of aftershocks. Use program APT and silence file A without changing it. Just understand the answers.

Repeat computations; do not type sigma but count aftershocks in two more time-intervals: 7 days and 30 days (Table 6).

\* \* \* \* \*

If you still have some time, you may try now any computations for another region which you are interested in. Ask the teacher for the access to the world's catalog.

Your ownname is

In your directory there are following files :

P.R. programs (see P.R. guide)

COIN.X

COD.X

COR.X

HAM.X

Data for intersections of morphostructural lineaments in California according to [I]:

COCLF.D - silence file (parameters of coding)

ORCLF.D - information on parameters

RACLF.D - binary codes of parameters

KACLF.D - silence file (parameters for the algorithm Cora)

Assign I, 2 and 3 to the classes D, N and X respectively.

I. Feed in initial data (Table in the Answers to written exercise III); use COIN.

To check yourself follow the correct sequence of actions :

TSM>GO COIN ; COI>y ; OREX ; I5 ; n ; 2 ; n ; r ; nl [n is forbidden] ; n ; I ; 0,2 ; n ; e.t.c. to correct the value of some parameter for the object punch the name of this parameter I5 ; 0,3 ; n ; n [no corrections] ; n [do not want to print] ; TSM>

Now in OREX file you have the values of parameters.

II. Code parameters from OREX. Use program COD and no initial silence file. The class for each object is given in the answer to the written exercise II. Subclasses: (I, 2), (7, 8, IO), (I3, I4). Create the silence file KAEX and file RAEX with binary codes of data.

To check yourself follow the correct sequence of actions :

TSM>GO COD ; COD>OREX ; 3 ; / ; I ; e.t.c. [class according to the exercise II] ... 3 ; n [for any correction punch the name of object to be corrected] ; y ; 3 ; / ; 2 ; / ; I ; 2 ; n ; 7 [example of error: there are 3 objects in the 2 subclass] ; 3 ; / ; 7 ; 8 ; 9 [example of error: object 9 is in the 2 class] ; I3 ; y [you have to change subclass] ; / ; 7 ; 8 ; IO ; n ; 2 ; / ; I3 ; I4 ; n ; n ; [end of the subclasses' identification] r ; a ; 3 ; y ; n ; s ; nl ; t ; I ; I ; [you can see on the screen that there are I objects with NL = 2; code NL with the threshold 2] n ; h ; 2/ ; y ; n ; s ; n ; n ; COEX ; n ; RAEX ; y ; [you

### III. Pattern recognition with the Cora algorithm

Use program COR , no initial silence file and data from RAEX. Create silence file KAEX with parameters from the following correct sequence of actions:

```
COR>
TSM>GO COR ; KAEX ; c ; RAEX ; IO ; n ; y [or I] ; 2,I,2,I ; n ; n ; y ;
y,y ; n,n ; y,n ; y ; n ; d [you can see on the screen the numbers of
traits selected: PI = I and P2 = I, it is not so bad for such a small
data set] ; [the screen shows: lattices of traits, traits, 2-dimensional
table of voting; take delta equal to I] I ; [classification for delta =
I is flashed] n ; n ; [the voting is flashed] TSM>
```

### IV. Pattern recognition with the HAM algorithm

Use program HAM , no initial silence file and data from RAEX. Create the silence file HAEX. To check yourself follow the correct sequence of actions:

```
HAM>
TSM>GO HAM ; HAEX ; c ; RAEX ; n ; n ; [the kernel and weights are flashed]
n ; / ; n ; n ; [the screen shows the voting (the Hamming's distances)]
TSM>
```

Punch LOG to check your directory.

Delete the files: OREX, COEX, RAEX, KAEX, HAEX.

YOU HAVE GONE THROUGH P.P. PROGRAMS WITH THIS EXAMPLE AND GOT ACQUAINTED WITH THEM. GO TO CALIFORNIA DATA [I].

Let us repeat the results from [I]. The data are already filed in COCLF.D, ORCLF.D, RACLF.D, KACLF.D.

V. Code parameters. Use COD. Do not change the answers in the silence files. Make sure you understand the meaning of each answer. To check yourself follow the correct sequence of actions :

```
COD>
TSM>GO COD ; COCLF.D ; y ; / ; n [be careful not to punch Y; it will lead to
new class identificatin for all objects] ; y ; n ; param ; [there is no
such parameter in ORCLF.D; names of parameters are flashed] h0 ; h ;
200,I200/ [in brackets there are thresholds from [I]; for practice just
repeat them] ; y ; n ; s ; e.t.c. (to flash the list of all parameters
punch any unexisting one) ; n ; h ; [5.11/ ; n ; n ; n ; n ; n ;
n ; n ; y ; [the coding is flashed] TSM>
```

### VI. Pattern recognition with the Cora-3 algorithm. Use COR.X.

```
COR>
TSM>GO COR ; KACLF ; y ; n ; [data from RACLF.D are flashed, for practice
just repeat the answers indicated in brackets] y ; 6,4,I2,2 ; n ; n ;
y ; y,y ; n,n ; y,n ; y ; [data from RACLF.D are flashed] n ; [runs the
algorithm] [flashed are:
L = I9 NI =43 N2 = 4I N3 = I4 KI =6 KIT = 4 K2 = I2 K2T = 2
NPM =30 PI =I5 P2 = I3 IN =I ] d ; [lattices of traits, traits,
2-dimensional table of voting, numbers of objects with voting greater
then k (k = -5, -4, ... , 4, 5) are flashed] [punch data as in [I]: 2]
2 ; n ; n ; [the voting is flashed] TSM>
```

If you have time try to change the coding of the parameters and other answers. Use the HAM algorithm as well as the Cora-3.



```

1: EXERCISES FROM NUMBER- 1
   SELECT CAPAS-9 1 8299 EVENTS
   FROM 1900YR-1M-15-0H-0M TO 1994 1 1 0 0
2: FROM MAGNITUDE-
   COEFF-1.00, MAG-50, MS- 1.00, .00, ML- 1.00, .00, MP- 1.00, .00
3: FROM MAGNITUDE-10.00, .00, 9.00
   FROM MAGNITUDE-10.00, .00, 9.00
4: FROM MAGNITUDE-10.00, .00, 9.00
   FROM MAGNITUDE-10.00, .00, 9.00
5: FROM MAGNITUDE-10.00, .00, 9.00
   FROM MAGNITUDE-10.00, .00, 9.00
6: FROM MAGNITUDE-10.00, .00, 9.00
   FROM MAGNITUDE-10.00, .00, 9.00
7: FROM MAGNITUDE-10.00, .00, 9.00
   FROM MAGNITUDE-10.00, .00, 9.00
8: FROM MAGNITUDE-10.00, .00, 9.00
   FROM MAGNITUDE-10.00, .00, 9.00
END OF SCAT

```

To the exercise Ia.

```

1: EXERCISES FROM NUMBER- 1
   SELECT CAPAS-9 1 8299 EVENTS
   FROM 1900YR-1M-15-0H-0M TO 1994 1 1 0 0
2: FROM MAGNITUDE-
   COEFF-1.00, MAG-50, MS- 1.00, .00, ML- 1.00, .00, MP- 1.00, .00
3: FROM MAGNITUDE-10.00, .00, 9.00
   FROM MAGNITUDE-10.00, .00, 9.00
4: FROM MAGNITUDE-10.00, .00, 9.00
   FROM MAGNITUDE-10.00, .00, 9.00
5: FROM MAGNITUDE-10.00, .00, 9.00
   FROM MAGNITUDE-10.00, .00, 9.00
6: FROM MAGNITUDE-10.00, .00, 9.00
   FROM MAGNITUDE-10.00, .00, 9.00
7: FROM MAGNITUDE-10.00, .00, 9.00
   FROM MAGNITUDE-10.00, .00, 9.00
8: FROM MAGNITUDE-10.00, .00, 9.00
   FROM MAGNITUDE-10.00, .00, 9.00
END OF SCAT

```

Table 3.





1: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
2: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS

3: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
4: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS

5: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
6: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS

7: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
8: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS

9: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
10: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS

11: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
12: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS

13: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
14: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS

15: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
16: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS

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18: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS

19: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
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28: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS

29: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
30: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS

31: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
32: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS

33: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
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39: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
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41: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
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43: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
44: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS

45: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS  
46: 1 OF INPUT CATALOG - CIGTP 1996 EVENTS

Table 6. (Sigma is omitted on the screen but kept on printout.)

