U.S. DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

HyperCard Database for Correlation of Marine and Terrestrial Records Project

by

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I) Abstract

A HyperCard database was designed for the Correlation of Marine and Terrestrial Records (CMTR) project to organize multidisciplinary, multivariate sets of the data in an easily retrievable, user-friendly environment that could be used by the project scientists with little or no training. Because the volume of data from the project is relatively large and the data types are diverse, a database was required that allows easy updating, and provides some level of security. HyperCard was chosen to create the CMTR database because it satisfied the above criteria as well as being freely available to all owners of Macintosh computers, is easy to program, and provides a graphic user interface that allows for little or no familiarity with the program to retrieve data.

II) Introduction

A HyperCard-based database was needed for a large, multidisciplinary project in the U.S.G.S. Multivariate data from 35 deep-sea cores are presently listed in the database. The database contains general information for each core (core ID, latitude, longitude, water depth, core length, date core was collected, type of storage, and institution) as well as available analytical data that presently consist of abundances of planktonic forams, benthic forams, diatoms, radiolaria, nannofossils, ^{14}C dates, $\%CaCO_3$, major, minor, and trace element inorganic geochemistry, %organic carbon, clay mineralogy, grain mineralogy, grain size, pollen abundances, stable isotopes, %biogenic opal, and rock-eval pyrolysis results.

III) Hardware and software requirements

The CMTR database requires a Macintosh computer with color monitor, and at least 8 mb of RAM running under system 7.01 or higher. Apple HyperCard version 2.1 must be installed on the computer. In addition, the CMTR database requires 3 to 4 mb of free space on the hard drive for its software and datasets.

IV) How to set up the software

The software is user friendly and designed to operate on many different screens, but the following instructions should be carefully observed for program operation and data interrogation.

- Increase memory allocation for HyperCard to 5000k.
- Create a folder on the desk top and call it **CMTR Database**.

Copy the **CMTR Database** program and all the **Pict Files** from the floppy disk into this folder. Copy the **Data Files** folder from the floppy disk into the **CMTR Database** folder.

If the software hangs up and you want to break out of HyperCard, then press **Command •** . If you want to see the error message, press **Command M.** A rectangular box will appear at the bottom of the screen. If you want to see the menu bar, type **Show Menubar** in the message box.

V) CMTR Program Overview

The HyperCard program opens as soon as you click on the CMTR program icon. The first screen you see is the earth (Figure 1). From here, the instructions lead you step-by-step through the identification and extraction of data. The database has several layers, each succeeding layer contains more-detailed information about the choice selected than in the previous layer. The first layer gives you the complete map of all the areas. The next layer displays the core locations in the selected area. The next layer show data types available from a core chosen in the selected core. The last layer is a flat file containing the data of the selected data type. The following is an example of a search.

A) Double click on the CMTR database program. Next click on the earth (Figure 1) to start, and a map of the eastern north Pacific appears (Figure. 2). Six area boxes appear where data are available.

1) Click anywhere within the bounding box adjacent to an area name (such as Russian River). A bathymetry map of the Russian River appears (Figure 3) with IDs and locations of available cores within the area.
2) Click on the square box at the left corner of the map tittle bar to take you to back to the previous screen.
3) Click on the QUIT HyperCard box at the upper left corner and the program will close and quit.
4) If you click any of the outside bounding boxes, an error message will appear.
5) Click at the core symbol (solid circle adjacent to the core ID). The new screen will give you a list of information about that core and what analytical data are available for the core (Figure 4). This screen will show the core ID, latitude, longitude, institution, water depth, core length, date core was collected and type of storage.

B) Below the General Information is a series of buttons (a square box with the circle inside). A list of data variables describes analytical data available for the chosen core (i.e. $CaCO_3$, organic carbon, diatoms, etc.).

1) Click one of the data buttons (e.g., Planktonic forams) and the next card shows the flat file (available Planktonic forams data) for the selected core (Figure 5). If the data file is longer than one screen, the scroll bar to the right of the data box can be used to advance the stored information. The vertical scroll bar is used to access the data when longer than the screen. If the data file is wider

than one screen, use the *right* button to see the fields on the right. Click at the *left* button to move to the fields on the left (Figure 5.1). The following explains the small vertical icons at the right side of the screen:

a) Quit HyperCard button is used to exit HyperCard.

b) Main Menu button is used to return to the introduction card (Figure 1) to begin the new search.

c) Click at the *TO Gen Infor* button when a data from a different variable from the same card is needed. The General Information Card (Figure 4) will reappear.

d) The **SAVE AS** command from the menu bar (Figure 5) is used to extract the present data file as an ASCII-formatted output file. The program will ask you to choose the output file name (Figure 6). By default, the new file will be created and located in the same directory as the CMTR program. You can save the new file in another folder or floppy disk if you wish. For example, if you run from the hard drive and want to copy to the "My floppy" disc, then type "My floppy:My copy file" and return. The "My copy file" file contains the data information of the file on your screen and they are saved on the "My floppy" floppy disk.
Note: You must have the colon between the strings.

2) You can return to the previous map by clicking on bottom-left button *Return to the last map*, or print out the data file by clicking at the bottom right button *Print this page* (Figure 4).

VI) Detail of the Program

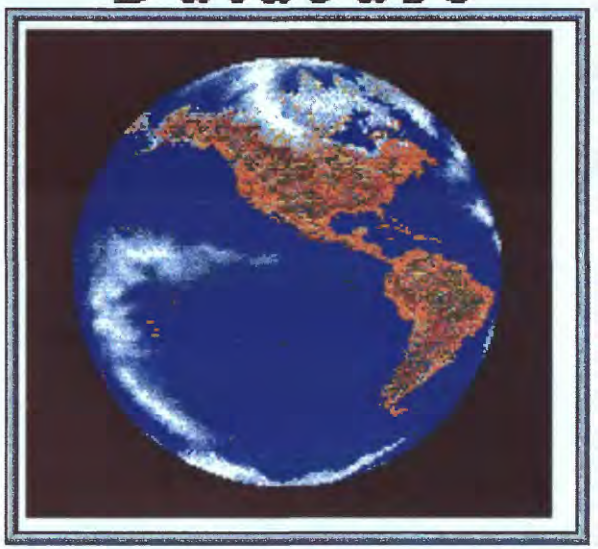
The program uses HyperTalk, which is the scripting language of HyperCard. The script file is written from the stack level with the addition of the **SAVE FILE** option on the menu bar. The program is also written from the card level. The *Main-Menu* program is run from card level to generate the Earth picture (Figure 1), and calls the *Index-map* program. The *Index-map* program initializes all the variables of maps, erases the Earth picture and displays the map of the Eastern North Pacific and Western U.S. From this step, the program will call the *Main Program* that was written from the card-button level. The main program lets the user progress from one layer to another through the detailed maps.

To achieve the above goals, some external command (XCMD) programs were written in Think C software and attached to the HyperCard software. The XCMD programs are used to increase HyperCard performance so that the binary data files are read and sent directly to the Tables card. To take advantage of the HyperTalk language and save memory, only the active program is loaded. Each picture file is loaded only when it is called. If the same picture file is reaccessed, then it will be recalled instead of reloaded to save memory.

The following are the files and folders needed to run the CMTR database.

- CMTR data base: This is a main program.
- Earth map PICT: This map picture contains the earth map that appears when this program starts up.
- COW map PICT: This map picture contains all 6 areas of the Eastern North Pacific.
- Russian River map PICT, SCalif map PICT, Farallones map PICT, Juan de Fuca map PICT, Central Calif map PICT, Gorda map PICT: These map pictures contain all the cores in their areas.
- Data Files folder: This folder contains the data file subfolders. The name of each subfolder is the name of a unique core. Each subfolder contains the detailed data of a particular core in binary format.

Correlation of Marine and Terrestrial Records Database



Click The Earth to Start

Data provided by James V. Gardner
Programming by Thang N. Phi
U.S.G.S, Menlo Park, CA

Figure 1

QUIT
Hyper
Card

Figure 2

QUIT
Hyper
Card

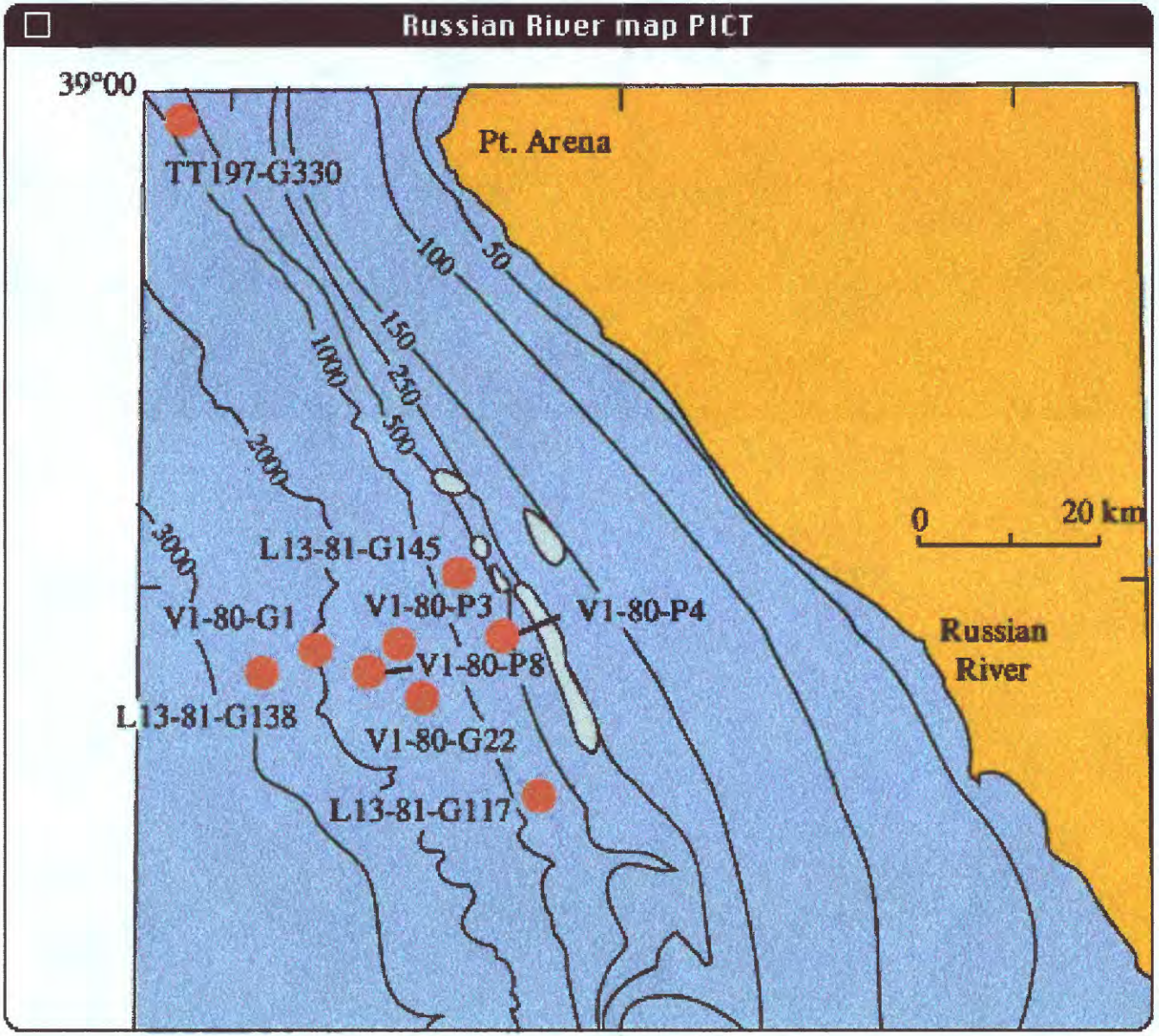


Figure 3

QUIT
Hyper
Card

GENERAL INFORMATION

Core ID	L13-81-G138	**Date core collected**	1981
Latitude	38°24.84' N	**Type of storage**	COLD
Longitude	123°58.26' W	**Institution**	U.S. Geological Survey
Water Depth	2531 m **(uncorrected m)**		
Core Length	4600 cm		

DATA AVAILABLE
(Click button to see data files)

- (•) **Planktonic forams**
- ( ) **Benthic forams**
- ( ) **Diatoms**
- ( ) **Radiolaria**
- ( ) **14 C Ages**
- ( ) **CaCO3**
- ( ) **Inorganic geochem**
- ( ) **Clay mineralogy**
- ( ) **Grain mineralogy**
- ( ) **Grain size**
- ( ) **Pollen**
- ( ) **Isotopes**
- ( ) **References**

( ) **Return to last map**

( ) **Print this page**

Figure 4

L13-81-G138 Pkt forams

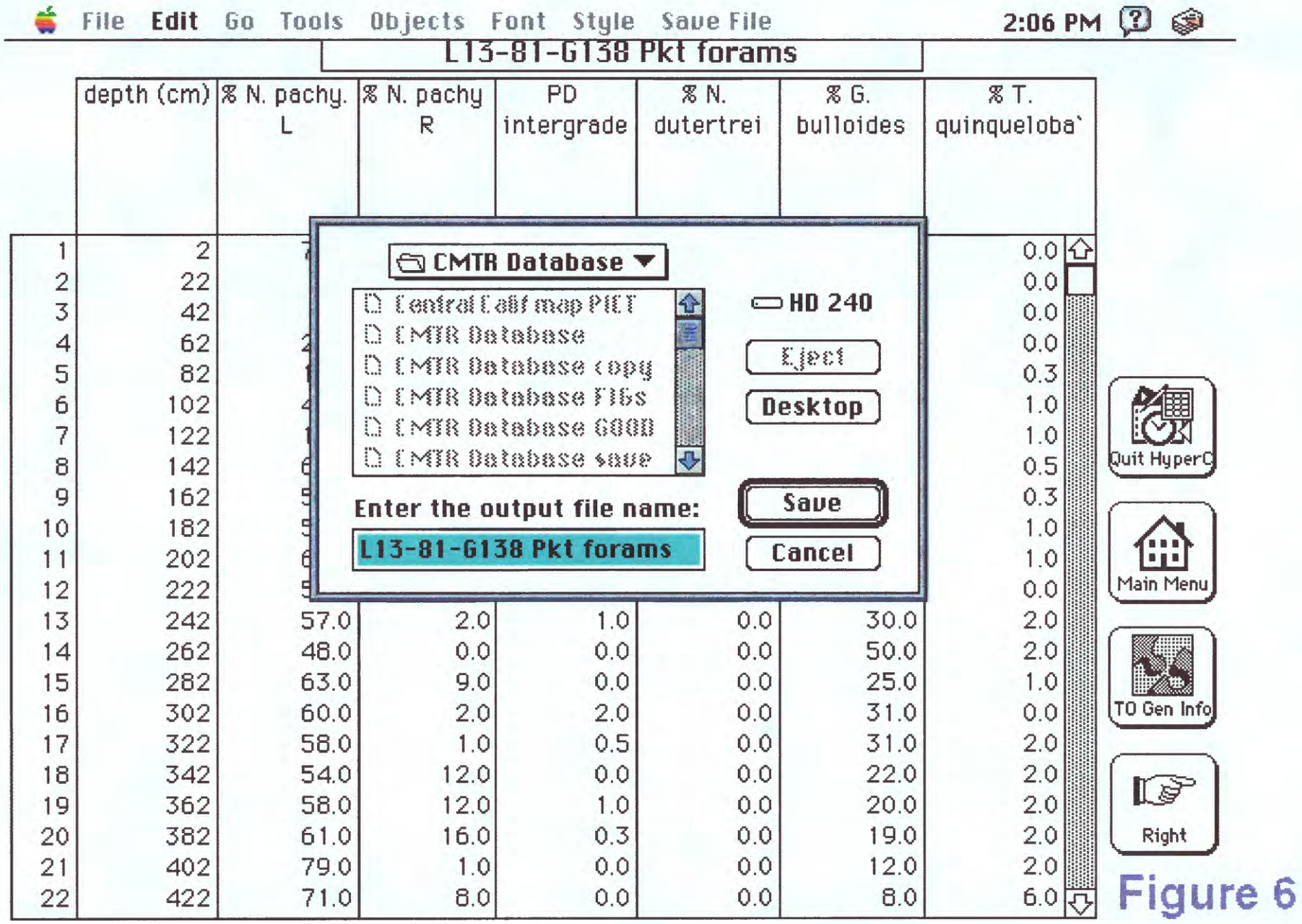
	depth (cm)	% N. pachy. L	% N. pachy R	PD intergrade	% N. dutertrei	% G. bulloides	% T. quinqueloba`
1	2	75.0	25.0	0.0	0.0	0.0	0.0
2	22	0.0	0.0	0.0	0.0	0.0	0.0
3	42	0.0	0.0	0.0	0.0	0.0	0.0
4	62	22.0	72.0	5.0	0.0	0.3	0.0
5	82	11.0	83.0	2.0	0.3	2.0	0.3
6	102	47.0	43.0	7.0	0.0	0.4	1.0
7	122	15.0	69.0	6.0	1.0	5.0	1.0
8	142	68.0	9.0	5.0	0.0	19.0	0.5
9	162	54.0	3.0	3.0	0.0	40.0	0.3
10	182	50.0	4.0	0.0	0.3	33.0	1.0
11	202	62.0	4.0	0.3	0.0	28.0	1.0
12	222	54.0	3.0	0.0	0.0	41.0	0.0
13	242	57.0	2.0	1.0	0.0	30.0	2.0
14	262	48.0	0.0	0.0	0.0	50.0	2.0
15	282	63.0	9.0	0.0	0.0	25.0	1.0
16	302	60.0	2.0	2.0	0.0	31.0	0.0
17	322	58.0	1.0	0.5	0.0	31.0	2.0
18	342	54.0	12.0	0.0	0.0	22.0	2.0
19	362	58.0	12.0	1.0	0.0	20.0	2.0
20	382	61.0	16.0	0.3	0.0	19.0	2.0
21	402	79.0	1.0	0.0	0.0	12.0	2.0
22	422	71.0	8.0	0.0	0.0	8.0	6.0

Figure 5

L13-81-G138 Pkt forams

	% G. glutinata	% G. scitula	% G. hexagona	% O. universa	% G. inflata	% G. umbilicata	% unknown
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.3	0.0	0.0	0.0
5	0.3	0.0	0.0	0.0	0.3	0.0	0.0
6	1.0	0.0	0.0	0.0	0.0	0.0	1.0
7	2.0	1.0	0.3	0.0	0.3	0.0	0.0
8	3.0	0.0	0.0	0.0	0.0	0.0	0.0
9	2.0	0.0	0.0	0.0	0.0	0.5	0.3
10	10.0	2.0	0.0	0.3	0.0	0.0	0.3
11	5.0	0.5	0.3	0.0	0.0	0.0	0.3
12	2.0	0.5	0.0	0.0	0.0	0.2	0.0
13	6.0	3.0	0.3	0.0	0.0	0.0	0.3
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	2.0	0.0	0.4	0.0	0.0	0.0	0.0
16	0.0	2.0	0.0	0.0	0.0	0.0	2.0
17	6.0	1.0	0.3	0.0	0.0	1.0	0.3
18	7.0	2.0	0.0	0.0	0.0	0.0	0.3
19	6.0	1.0	0.2	0.0	0.0	0.5	0.2
20	1.0	1.0	0.0	0.0	0.0	0.3	0.0
21	3.0	2.0	1.0	0.0	0.0	0.3	0.3
22	4.0	0.0	2.0	2.0	0.0	0.0	0.0

Figure 5.1



	depth (cm)	% N. pachy. L	% N. pachy R	PD intergrade	% N. dutertrei	% G. bulloides	% T. quinqueloba`
1	2						0.0
2	22						0.0
3	42						0.0
4	62						0.0
5	82						0.3
6	102						1.0
7	122						1.0
8	142						0.5
9	162						0.3
10	182						1.0
11	202						1.0
12	222						0.0
13	242	57.0	2.0	1.0	0.0	30.0	2.0
14	262	48.0	0.0	0.0	0.0	50.0	2.0
15	282	63.0	9.0	0.0	0.0	25.0	1.0
16	302	60.0	2.0	2.0	0.0	31.0	0.0
17	322	58.0	1.0	0.5	0.0	31.0	2.0
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19	362	58.0	12.0	1.0	0.0	20.0	2.0
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21	402	79.0	1.0	0.0	0.0	12.0	2.0
22	422	71.0	8.0	0.0	0.0	8.0	6.0

Figure 6