Publication Request:

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This file describes the contents of the heart-disease directory.

This directory contains 4 databases concerning heart disease diagnosis.

All attributes are numeric-valued. The data was collected from the

four following locations:

1. Cleveland Clinic Foundation (cleveland.data)

2. Hungarian Institute of Cardiology, Budapest (hungarian.data)

3. V.A. Medical Center, Long Beach, CA (long-beach-va.data)

4. University Hospital, Zurich, Switzerland (switzerland.data)

Each database has the same instance format. While the databases have 76

raw attributes, only 14 of them are actually used. Thus I've taken the

liberty of making 2 copies of each database: one with all the attributes

and 1 with the 14 attributes actually used in past experiments.

The authors of the databases have requested:

...that any publications resulting from the use of the data include the

names of the principal investigator responsible for the data collection

at each institution. They would be:

1. Hungarian Institute of Cardiology. Budapest: Andras Janosi, M.D.

2. University Hospital, Zurich, Switzerland: William Steinbrunn, M.D.

3. University Hospital, Basel, Switzerland: Matthias Pfisterer, M.D.

4. V.A. Medical Center, Long Beach and Cleveland Clinic Foundation:

Robert Detrano, M.D., Ph.D.

Thanks in advance for abiding by this request.

David Aha

July 22, 1988

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1. Title: Heart Disease Databases

2. Source Information:

(a) Creators:

-- 1. Hungarian Institute of Cardiology. Budapest: Andras Janosi, M.D.

-- 2. University Hospital, Zurich, Switzerland: William Steinbrunn, M.D.

-- 3. University Hospital, Basel, Switzerland: Matthias Pfisterer, M.D.

-- 4. V.A. Medical Center, Long Beach and Cleveland Clinic Foundation:

Robert Detrano, M.D., Ph.D.

(b) Donor: David W. Aha (aha@ics.uci.edu) (714) 856-8779

(c) Date: July, 1988

3. Past Usage:

1. Detrano,~R., Janosi,~A., Steinbrunn,~W., Pfisterer,~M., Schmid,~J.,

Sandhu,~S., Guppy,~K., Lee,~S., \& Froelicher,~V. (1989). {\it

International application of a new probability algorithm for the

diagnosis of coronary artery disease.} {\it American Journal of

Cardiology}, {\it 64},304--310.

-- International Probability Analysis

-- Address: Robert Detrano, M.D.

Cardiology 111-C

V.A. Medical Center

5901 E. 7th Street

Long Beach, CA 90028

-- Results in percent accuracy: (for 0.5 probability threshold)

Data Name: CDF CADENZA

-- Hungarian 77 74

Long beach 79 77

Swiss 81 81

-- Approximately a 77% correct classification accuracy with a

logistic-regression-derived discriminant function

2. David W. Aha & Dennis Kibler

--

-- Instance-based prediction of heart-disease presence with the

Cleveland database

-- NTgrowth: 77.0% accuracy

-- C4: 74.8% accuracy

3. John Gennari

-- Gennari, J.~H., Langley, P, \& Fisher, D. (1989). Models of

incremental concept formation. {\it Artificial Intelligence, 40},

11--61.

-- Results:

-- The CLASSIT conceptual clustering system achieved a 78.9% accuracy

on the Cleveland database.

4. Relevant Information:

This database contains 76 attributes, but all published experiments

refer to using a subset of 14 of them. In particular, the Cleveland

database is the only one that has been used by ML researchers to

this date. The "goal" field refers to the presence of heart disease

in the patient. It is integer valued from 0 (no presence) to 4.

Experiments with the Cleveland database have concentrated on simply

attempting to distinguish presence (values 1,2,3,4) from absence (value

0).

The names and social security numbers of the patients were recently

removed from the database, replaced with dummy values.

One file has been "processed", that one containing the Cleveland

database. All four unprocessed files also exist in this directory.

5. Number of Instances:

Database: # of instances:

Cleveland: 303

Hungarian: 294

Switzerland: 123

Long Beach VA: 200

6. Number of Attributes: 76 (including the predicted attribute)

7. Attribute Information:

-- Only 14 used

-- 1. #3 (age)

-- 2. #4 (sex)

-- 3. #9 (cp)

-- 4. #10 (trestbps)

-- 5. #12 (chol)

-- 6. #16 (fbs)

-- 7. #19 (restecg)

-- 8. #32 (thalach)

-- 9. #38 (exang)

-- 10. #40 (oldpeak)

-- 11. #41 (slope)

-- 12. #44 (ca)

-- 13. #51 (thal)

-- 14. #58 (num) (the predicted attribute)

-- Complete attribute documentation:

1 id: patient identification number

2 ccf: social security number (I replaced this with a dummy value of 0)

3 **age: age in years**

4 **sex: sex (1 = male; 0 = female)**

5 painloc: chest pain location (1 = substernal; 0 = otherwise)

6 painexer (1 = provoked by exertion; 0 = otherwise)

7 relrest (1 = relieved after rest; 0 = otherwise)

8 pncaden (sum of 5, 6, and 7)

9 **cp: chest pain type**

-- Value 1: typical angina

-- Value 2: atypical angina

-- Value 3: non-anginal pain

-- Value 4: asymptomatic

10 **trestbps: resting blood pressure (in mm Hg on admission to the**

**hospital)**

11 htn

12 **chol:** **serum cholestoral in mg/dl**

13 smoke: I believe this is 1 = yes; 0 = no (is or is not a smoker)

14 cigs (cigarettes per day)

15 years (number of years as a smoker)

16 **fbs: (fasting blood sugar > 120 mg/dl) (1 = true; 0 = false)**

17 dm (1 = history of diabetes; 0 = no such history)

18 famhist: family history of coronary artery disease (1 = yes; 0 = no)

19 **restecg: resting electrocardiographic results**

-- Value 0: normal

-- Value 1: having ST-T wave abnormality (T wave inversions and/or ST

elevation or depression of > 0.05 mV)

-- Value 2: showing probable or definite left ventricular hypertrophy

by Estes' criteria

20 ekgmo (month of exercise ECG reading)

21 ekgday(day of exercise ECG reading)

22 ekgyr (year of exercise ECG reading)

23 dig (digitalis used furing exercise ECG: 1 = yes; 0 = no)

24 prop (Beta blocker used during exercise ECG: 1 = yes; 0 = no)

25 nitr (nitrates used during exercise ECG: 1 = yes; 0 = no)

26 pro (calcium channel blocker used during exercise ECG: 1 = yes; 0 = no)

27 diuretic (diuretic used used during exercise ECG: 1 = yes; 0 = no)

28 proto: exercise protocol

1 = Bruce

2 = Kottus

3 = McHenry

4 = fast Balke

5 = Balke

6 = Noughton

7 = bike 150 kpa min/min (Not sure if "kpa min/min" is what was

written!)

8 = bike 125 kpa min/min

9 = bike 100 kpa min/min

10 = bike 75 kpa min/min

11 = bike 50 kpa min/min

12 = arm ergometer

29 thaldur: duration of exercise test in minutes

30 thaltime: time when ST measure depression was noted

31 met: mets achieved

32 **thalach: maximum heart rate achieved**

33 thalrest: resting heart rate

34 tpeakbps: peak exercise blood pressure (first of 2 parts)

35 tpeakbpd: peak exercise blood pressure (second of 2 parts)

36 dummy

37 trestbpd: resting blood pressure

38 **exang: exercise induced angina (1 = yes; 0 = no)**

39 xhypo: (1 = yes; 0 = no)

40 **oldpeak = ST depression induced by exercise relative to rest**

41 **slope: the slope of the peak exercise ST segment**

-- Value 1: upsloping

-- Value 2: flat

-- Value 3: downsloping

42 rldv5: height at rest

43 rldv5e: height at peak exercise

44 **ca: number of major vessels (0-3) colored by flourosopy**

45 restckm: irrelevant

46 exerckm: irrelevant

47 restef: rest raidonuclid (sp?) ejection fraction

48 restwm: rest wall (sp?) motion abnormality

0 = none

1 = mild or moderate

2 = moderate or severe

3 = akinesis or dyskmem (sp?)

49 exeref: exercise radinalid (sp?) ejection fraction

50 exerwm: exercise wall (sp?) motion

51 **thal: 3 = normal; 6 = fixed defect; 7 = reversable defect**

52 thalsev: not used

53 thalpul: not used

54 earlobe: not used

55 cmo: month of cardiac cath (sp?) (perhaps "call")

56 cday: day of cardiac cath (sp?)

57 cyr: year of cardiac cath (sp?)

58 **num: diagnosis of heart disease (angiographic disease status)**

-- Value 0: < 50% diameter narrowing

-- Value 1: > 50% diameter narrowing

(in any major vessel: attributes 59 through 68 are vessels)

59 lmt

60 ladprox

61 laddist

62 diag

63 cxmain

64 ramus

65 om1

66 om2

67 rcaprox

68 rcadist

69 lvx1: not used

70 lvx2: not used

71 lvx3: not used

72 lvx4: not used

73 lvf: not used

74 cathef: not used

75 junk: not used

76 name: last name of patient

(I replaced this with the dummy string "name")

9. Missing Attribute Values: Several. Distinguished with value -9.0.

10. Class Distribution:

Database: 0 1 2 3 4 Total

Cleveland: 164 55 36 35 13 303

Hungarian: 188 37 26 28 15 294

Switzerland: 8 48 32 30 5 123

Long Beach VA: 51 56 41 42 10 200

3 age: age in years

4 sex: sex (1 = male; 0 = female)

9 cp: chest pain type

-- Value 1: typical angina

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-- Value 4: asymptomatic

10 trestbps: resting blood pressure (in mm Hg on admission to the

hospital)

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(in any major vessel: attributes 59 through 68 are vessels)