Relationship between Ischemic Stroke 30-Day Mortality and 30-Day Readmission Rates, Hospital Quality Ratings, and Location.

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Abstract

This paper examines the relationship between Ischemic Stroke 30-Day Mortality and 30-Day Readmission Rates, Hospital Quality Ratings, and Location. (More will be added after data description)

1. Data Description

The dataset name is, "Ischemic Stroke 30-Day Mortality and 30-Day Readmission Rates and Quality Ratings for CA Hospitals." We got it from Data.gov, which is a reputable source to pull data from. The hyperlink to the dataset is as follows. The purpose of this dataset is to show risk-adjusted 30 day mortality and readmission rates, as well as quality ratings and deaths/readmissions, for Ischemic Strokes treated in hospitals in California. This dataset is important as it shows how hospital ratings are related to stroke readmissions and deaths: and a possible correlation could demonstrate the need for hospitals to increase their ratings in order to lower readmission or death rates. The URL is available here:

Stroke Dataset Link

We investigated a rich dataset with 9 variables: 5 numeric, and 4 categorical. We created a subset to include only the five most populated counties in California. The variables are listed as follows:

- Year: quantitative discrete, year data was recorded).
- County: categorical, county data was recorded in.
- Hospital: categorical, hospital data was recorded in.
- OSHPDID: categorical, hospital ID, not important for research question).
- Risk Adjusted Rate: quantitative continuous (float), risk rate adjusted for age, health severity, readmissions and deaths).
- Number of Deaths/Readmissions: quantitative continuous (float), number of deaths/readmissions for hospital that year.
- Number of Cases: quantitative continuous (float), number of hospital cases
- Hospital Ratings: categorical, patient hospital rating.
- Location: quantitative (float), hospital location coordinates.

Data Dimensions The size and the shape of the data is 1,026 observations with 9 columns.

Data Quality Notes: The data had missing values. They were replaced with np.Nan so no additional cleaning was needed. Data cleaning included: coercing columns with periods to numeric as a precaution, removing unnecessary wording, splitting the year column to change the format from "2011-2012" to "2011", and changing the year column to numeric. These changes will make data visualization simpler. There were no unnecessary dollar signs, commas, or other characters. The original data set was quite large, so the 5 most populated counties were subsetted to make the dataset mroe manageable for analysis. The location column was removed because it was not necessary to answer the research question.

There are some outliers in the dataset. Boxplots were made for the three numeric variables: risk adjusted rate, number of cases, and number of deaths/readmissions. All of these variables were right skewed. Future steps will involve transformations to fix the data and curb the number of outliers.

1.1. Context and Relevance

Our project/goal is to investigate the relationships between year and county and how they relate to risk adjusted rate, deaths, readmissions, and case count. This investigation is important from a public health standpoint, and provides helpful insight into hospital functioning in the California area. Understanding which hospitals have higher deaths and cases, as well as how hospital ratings affect cases, deaths, and readmissions, would help policy makers identify hospitals in need of imporovement, and provide recommendations of how to improve patient care.

2. Format of the Paper

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The text of the paper should be formatted in two columns, with an overall width of 6.75 inches, height of 9.0 inches, and 0.25 inches between the columns. The left margin should be 0.75 inches and the top margin 1.0 inch (2.54 cm). The right and bottom margins will depend on whether you print on US letter or A4 paper, but all final versions must be produced for US letter size. Do not write anything on the margins.

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The paper title should be set in 14 point bold type and centered between two horizontal rules that are 1 point thick, with 1.0 inch between the top rule and the top edge of the page. Capitalize the first letter of content words and put the rest of the title in lower case.

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0.25 inches of space before the heading and 0.15 inches after the heading.

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You may want to include figures in the paper to illustrate your approach and results. Such artwork should be centered, legible, and separated from the text. Lines should be dark and at least 0.5 points thick for purposes of reproduction, and text should not appear on a gray background.

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[1]Footnotes should be complete sentences.

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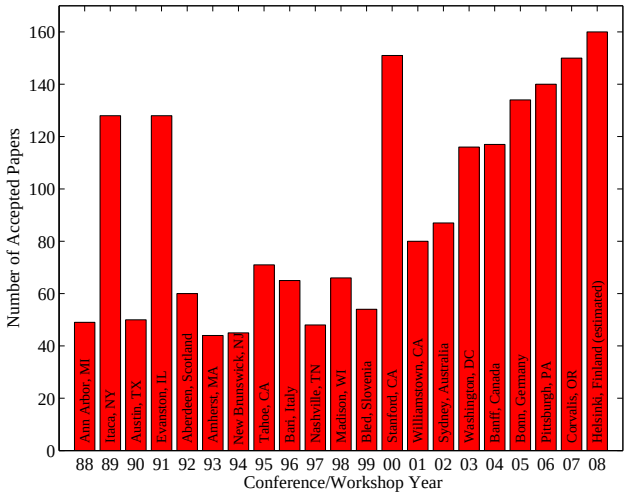

Figure 1. Historical locations and number of accepted papers for International Machine Learning Conferences (ICML 1993 – ICML 2008) and International Workshops on Machine Learning (ML 1988 – ML 1992). At the time this figure was produced, the number of accepted papers for ICML 2008 was unknown and instead estimated.

Algorithm 1 Bubble Sort

Input: data x_i, size m
repeat
  Initialize $noChange = true.$
  for $i = 1$ **to** $m - 1$ **do**
    if $x_i > x_{i+1}$ **then**
      Swap x_i and x_{i+1}
      $noChange = false$
    end if
  end for
until $noChange$ is $true$

2.7. Algorithms

If you are using LaTeX, please use the "algorithm" and "algorithmic" environments to format pseudocode. These require the corresponding stylefiles, algorithm.sty and algorithmic.sty, which are supplied with this package. Algorithm 1 shows an example.

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Table 1. Classification accuracies for naive Bayes and flexible Bayes on various data sets.

DATA SET	NAIVE	FLEXIBLE	BETTER?
BREAST	95.9± 0.2	96.7± 0.2	√
CLEVELAND	83.3± 0.6	80.0± 0.6	×
GLASS2	61.9± 1.4	83.8± 0.7	√
CREDIT	74.8± 0.5	78.3± 0.6	
HORSE	73.3± 0.9	69.7± 1.0	×
META	67.1± 0.6	76.5± 0.5	√
PIMA	75.1± 0.6	73.9± 0.5	
VEHICLE	44.9± 0.6	61.5± 0.4	√

Tables contain textual material, whereas figures contain graphical material. Specify the contents of each row and column in the table's topmost row. Again, you may float tables to a column's top or bottom, and set wide tables across both columns. Place two-column tables at the top or bottom of the page.

2.9. Theorems and such

The preferred way is to number definitions, propositions, lemmas, etc. consecutively, within sections, as shown below.

Definition 2.1. A function $f : X \to Y$ is injective if for any $x, y \in X$ different, $f(x) \neq f(y)$.

Using Definition 2.1 we immediate get the following result:

Proposition 2.2. *If f is injective mapping a set X to another set Y, the cardinality of Y is at least as large as that of X*

Proof. Left as an exercise to the reader. □

Lemma 2.3 stated next will prove to be useful.

Lemma 2.3. *For any $f : X \to Y$ and $g : Y \to Z$ injective functions, $f \circ g$ is injective.*

Theorem 2.4. *If $f : X \to Y$ is bijective, the cardinality of X and Y are the same.*

An easy corollary of Theorem 2.4 is the following:

Corollary 2.5. *If $f : X \to Y$ is bijective, the cardinality of X is at least as large as that of Y.*

Assumption 2.6. The set X is finite.

Remark 2.7. According to some, it is only the finite case (cf. Assumption 2.6) that is interesting.

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