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CSCI 447: Project 1

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Abstract

A brief, one paragraph abstract summarizing the results of the experiments

Keywords: Keywords, Go, Here

1. Introduction

Problem statement, including hypothesis

2. Problem Statement

3. Algorithm

Per the instructions of the assignment, we implemented the naive Bayes algorithm on the five provided datasets. Given some example $x \in X$, where X is our dataset, naive Bayes predicts the correct class c of x by computing the probabilities of each possible classification for x. For class c, the probability is denoted as follows: $P(c|a_1, a_2, ..., a_d)$ where a_k denotes one of d attribute values in x. To compute this probability for each class c, the probabilities of each attribute value are computed. For each attribute value a_k, we compute $\prod_{i=0}^{d} P(a_i|c)$

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Appendix A.

In this appendix we prove the following theorem from Section 6.2:
Theorem *Let u, v, w be discrete variables such that v, w do not co-occur with u (i.e., $u \neq 0 \Rightarrow v = w = 0$ in a given dataset $\mathcal{D}$). Let N_{v0}, N_{w0} be the number of data points for which $v = 0, w = 0$ respectively, and let I_{uv}, I_{uw} be the respective empirical mutual information values based on the sample $\mathcal{D}$. Then*

$$N_{v0} \; > \; N_{w0} \;\; \Rightarrow \;\; I_{uv} \; \leq \; I_{uw}$$

with equality only if u is identically 0. ■
Proof. We use the notation:

$$P_v(i) \; = \; \frac{N_v^i}{N}, \quad i \neq 0; \quad P_{v0} \; \equiv \; P_v(0) \; = \; 1 - \sum_{i \neq 0} P_v(i).$$

These values represent the (empirical) probabilities of v taking value $i \neq 0$ and 0 respectively. Entropies will be denoted by H. We aim to show that $\frac{\partial I_{uv}}{\partial P_{v0}} < 0$....

Remainder omitted in this sample. See http://www.jmlr.org/papers/ for full paper.