CSCI3230 Written Assignment 2-Machine Learning Chung Tsz Ting 1155110208

1. Given that the Information Content

,

when one specific value has it’s value of , and the other value

In this case, the information content is the lowest as the variable ***V*** is extremely predicable and its variance is 0.

when (uniform distribution),

this means the variance of the variable is extremely high and the variable ***V*** is extremely unpredictable and thus the information content is the highest.



By resolution, resolves the pairs in with complementary literals.

Firstly, by resolving and with complementary literals of and . The resolvent is and add it to the knowledge base.

Secondly, by resolving and with complementary literals of and . The resolvent is and add it to the knowledge base.

Thirdly, by resolving and with complementary literals of and . The resolvent is and add it to the knowledge base.

Fourthly, by resolving and with complementary literals of and . The resolvent is and add it to the knowledge base.

Finally, by resolving and with complementary literals of and . The resolvent is an empty clause which is not satisfiable. Thus, the contradiction arises and it is impossible to have a knowledge base with the query be negated. Thus, is true.

1. Higher-order logic is a form of predicate logic that able to quantify over functions and relations and also over objects. It has strictly more expressive power and have additional quantifiers and sometimes stronger semantics than first-order logic.

Example of higher-order logic would be like ∀x, y (x = y). This represents 2 objects are equal iff all properties, p, applied to them are equivalent. To illustrate in first-order logic, it is ∀x, y (x = y) ⇔∀p p(x) ⇔ p(y)). A complete example case would be the offshoots of Church’s Simple theory of types.

1. Evaluate by calculating the accuracy, precision, recall and f-measure with cross validation, in which

(TP = True Positive, TN = True Negative, FP = False Positive, FN = False Negative)

1. Accuracy doesn’t perform well in skewed dataset. For the case of bias dataset like having 90 example of cluster 1 and 10 example of cluster 2, the accuracy can still be high even getting a poor prediction on cluster 2, for example getting all correct in cluster 1 and all wrong in cluster 2 will have accuracy of 90%.
2. F-measure doesn’t take True Negative into account and assumes the distribution of the real and predicted examples are the same.