Forest Cover Classification

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I. Introduction

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TABLE I
TABLE TYPE STYLES

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[a]Sample of a Table footnote.

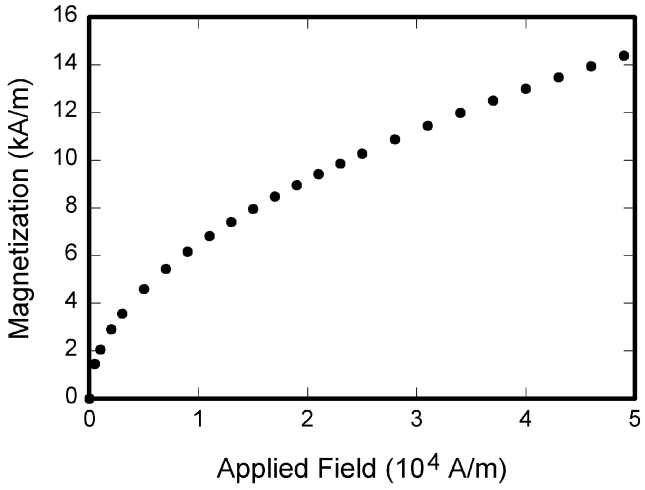

Fig. 1. Example of a figure caption.

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II. Introduction

III. Background

A. k-nearest Neighbours (kNN)

The nearest neighbour algorithm is an example of instance-based learning where the prediction for an instance is made by comparing the instance to similar training instances. This is a lazy learning approach since we delay processing training data until prediction is needed. Since kNN is also similarity-based, it is non-parametric, which means that it does not learn a mapping from the input space to the output space.

The k-nearest neighbour algorithm is presented in Algorithm 1 which explains that we calculate the distance from each data point in our training dataset to the distance. From there, we choose the closed k observations and perform inference. In a classification context we may perform majority voting to determine the class, in a regression context we use the mean or median of the k nearest observations.

In order to use the algorithm we need to define a value of k which decides the number of nearest neighbour instances to consider when predicting. Choosing a value a low value for k results in a high variance, but low bias leading to an unstable model which tends to overfit. Choosing a large value for k results in a smaller variance, but high bias, leading to a more stable model which tending to underfit. Measures such as k-fold cross validation assist in the selection of a value of k.

Algorithm 1 k-Nearest Neighbors Algorithm

```
function kNN(D, x, k)
    for all x' ∈ D do
        d = distance(x, x')
    end for
    sort(d)
    S = set of k patterns in D closest to x
    return class as majority class in S
end function
```

Notation: D denotes the training dataset, x is the query instance, k is the number of nearest neighbours, and distance$(\cdot)$ is a distance metric (e.g., Euclidean distance).

B. Classification Trees

Classification trees represent a fundamental approach in supervised machine learning for predictive modelling, where the learned model forms a hierarchical tree structure with non-terminal nodes representing decisions on descriptive features and terminal leaf nodes representing target feature predictions [**?**]. A classification tree is a type of decision tree where leaf nodes represent different discrete classes.

C. Expectations With Respect to Data Quality Issues

IV. Methodology

V. Empirical Procedure

VI. Research Results

VII. Conclusion

References

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References

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