Sample Format for Research Papers and Undergraduate Theses

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Abstract

In this paper, we talk about abstract things. Suspendisse potenti. Proin justo lorem, rutrum ac, facilisis in, malesuada sed, ligula. Mauris lobortis lacus at nibh. Aenean vitae odio vel odio placerat hendrerit. Suspendisse lacus lacus, tempor id, pharetra eget, ornare sit amet, pede. Sed aliquet, justo ac elementum pretium, arcu leo placerat est, a luctus purus diam eget arcu. Nam augue diam, mollis a, scelerisque eget, aliquet condimentum, pede. Vestibulum tristique lectus sed augue.

1 Introduction

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2 Problem Statement

This is a test. Blah, blah, blah. $\Pr(A) = \Pr(A) + \Pr(B|A)$. We discuss this issue in Section 5.1. Indeed, we have

$$\sum_{k=1}^{n} f(k) \ ,$$

where $f(k)$ is my favorite function.

3 Related Work

Lorem ipsum dolor sit amet, consectetuer adipiscing elit [1]. Phasellus non erat eu dui dignissim dictum. Integer iaculis nulla at nisl [2]. Proin ut enim non ipsum varius laoreet [4, 6]. Integer feugiat, ante fringilla blandit convallis, leo sapien egestas velit, non condimentum nulla sem vitae risus. Mauris aliquam auctor quam. Sed ac enim. Donec mattis dui id ligula. Integer vel sem eget ante cursus tristique. Nullam vel orci vitae sem interdum placerat. In eget lectus. Donec blandit. Quisque lacus urna, malesuada vel, mollis sit amet, rutrum nec, est. Proin blandit ornare nibh. Duis et felis [5].

4 Approach

Here is an example of code:

```
int main()
{
  cout << "testing" << endl;
  return 0;
} // main
```

Text. Plain text. *Emphasized text. Italicized text.* **Boldfaced text**. `typewriter text.` Large text. Our results appear in Table 1. In their paper [4], they discuss a lot of interesting things.

Em dash — which is followed by an en dash – and then we have eloquently-hyphenated words, which are not to be confused with the minus sign: $-$. All are different [7].

Here is a quote:

> Ask not what your country can do for you. Ask what you can do for your country.

In Figure 1, we present an algorithm for finding the minimum component of a vector. But there are other ways to present algorithms. Some have started using the `algorithm` and `algorithmic` packages. See Algorithm 1 as an example. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Nam iaculis, felis nec semper malesuada, quam metus placerat ligula, id euismod purus eros eget justo. Pellentesque ipsum. In hac habitasse platea dictumst. Ut pede pede, sagittis sit amet, dapibus eu, tristique in, ipsum [3].

Paragraph. Something you may never use, kind of like Latin.[1] Aliquam fermentum velit tristique turpis. Mauris mollis dapibus purus. Quisque vulputate ullamcorper purus. Quisque aliquam rhoncus felis. Aenean fringilla mattis mi. Ut ut massa a sem fermentum venenatis. Fusce ut risus. Maecenas ut nisl. Praesent felis erat, tincidunt ac, placerat vel, sodales vel, justo. Vivamus semper sollicitudin est. Morbi id eros eu tellus dignissim viverra [1].

Text. See Figure 2. Nullam massa est, facilisis at, egestas non, lobortis at, felis. Vestibulum eu velit ut justo commodo pretium. Quisque commodo velit vel sem. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec nec magna. Aliquam erat volutpat.

[1] And footnotes.

Algorithm ($\vec{x}$)

$\vec{x}$: vector of numbers
i: index of minimum value
min: minimum value

$m \leftarrow \infty$
for $j \leftarrow 1, \ldots, n$ // Loop over components
  if $(\vec{x}_j < min)$
    $min \leftarrow \vec{x}_j$
    $i \leftarrow j$
  end;
end;
return i
end.

Figure 1: Algorithm for finding the minimum component of a vector.

Theorem 4.1 (Kolter and Maloof [3]) *For any time steps* $\mathrm{t}_1 < \mathrm{t}_2$*, if we stipulate that* $\beta + 2\gamma < 1$*, then the number of mistakes that* ***AddExp.D*** *will make between time steps* t_1 *and* t_2 *can be bounded by*

$$M_{t_2} - M_{t_1} \leq \frac{\log(W_{t_1}/W_{t_2})}{\log(2/(1+\beta+2\gamma))} .$$

Proof. **AddExp.D** operates by multiplying the weights of the experts that predicted incorrectly by β. If we assume that a mistake is made at time step t then we know that at least $1/2$ of the weight in the ensemble predicted incorrectly. In addition, a new expert will be added with weight γW_t. So we can bound the weight with

$$W_{t+1} \leq \frac{1}{2}W_t + \frac{\beta}{2}W_t + \gamma W_t = \frac{1+\beta+2\gamma}{2}W_t .$$

Applying this function recursively leads to:

$$W_{t_2} \leq \frac{1+\beta+2\gamma}{2}^{M_{t_2}-M_{t_1}} W_{t_1} .$$

Taking the logarithm and rearranging terms gives the desired bound, which will h old since the requirement that $\beta + 2\gamma < 1$ ensures that $(1+\beta+2\gamma)/2 < 1$. □

5 Experimental Study

Always put something here, even if it just informs the reader of what comes next. Integer odio lorem, aliquam id, dignissim in, varius at, neque. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos himenaeos. Maecenas vitae massa ultrices lorem aliquam pharetra. In hac habitasse platea dictumst. Nunc consectetuer sapien. Maecenas ut felis. Sed blandit congue mauris. Donec ornare laoreet tortor. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Fusce id neque ac enim lobortis aliquet. Sed a purus ac nunc

Algorithm 1 Paired Learner

Input: $\{\vec{x}_t, y_t\}_{t=1}^{T}$, w, θ
$\{\vec{x}_t, y_t\}_{t=1}^{T}$: training data
w: window size for the reactive learner
θ: threshold for creating a new stable learner
Let S be a stable learner
Let R_w be a w-reactive learner
Let C be a circular list of w bits, each initially 0
for $t \leftarrow 1$ **to** T **do**
  $\hat{y}_S \leftarrow S.\mathsf{Classify}(\vec{x}_t)$
  output $\hat{y}_S$
  $\hat{y}_R \leftarrow R_w.\mathsf{Classify}(\vec{x}_t)$
  if $\hat{y}_S \neq y_t \wedge \hat{y}_R = y_t$ **then**
    $C.\mathsf{set}(t)$
  else
    $C.\mathsf{unset}(t)$
  end if
  if $\theta < C.\mathsf{proportionOfSetBits}()$ **then**
    $S \leftarrow$ **new** $\mathsf{StableLearner}()$
    $S \leftarrow R_w.\mathsf{getConceptDescription}()$
    $C.\mathsf{unsetAll}()$
  end if
  $S.\mathsf{Train}(\vec{x}_t, y_t)$
  $R_w.\mathsf{Train}(\vec{x}_t, y_t)$
end for

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5.1 Method

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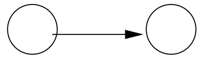

Figure 2: A pretty picture.

Table 1: This is my table.

naive Bayes	95.6±0.15
ID3	82.6±1.2

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5.2 Results

In Table 1, we present the results of our study. In Figure 3, we present the results of our study. Aliquam fermentum velit tristique turpis. Mauris mollis dapibus purus. Quisque vulputate ullamcorper purus. Quisque aliquam rhoncus felis. Aenean fringilla mattis mi. Ut ut massa a sem fermentum venenatis. Fusce ut risus. Maecenas ut nisl. Praesent felis erat, tincidunt ac, placerat vel, sodales vel, justo. Vivamus semper sollicitudin est. Morbi id eros eu tellus dignissim viverra.

5.3 Analysis

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6 Conclusion

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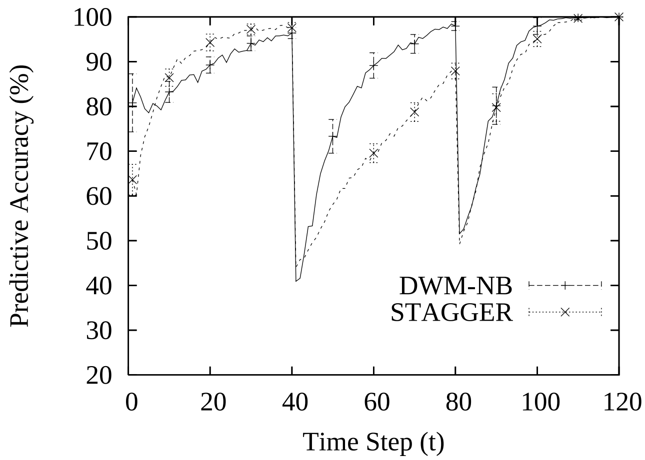

Figure 3: Results.

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Acknowledgements

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