Baum-Welch Algorithm for Hidden Markov Models Using Algebraic Decision Diagrams

Sebastian Aaholm*, Lars Emanuel Hansen†, Daniel Runge Petersen‡,

Abstract—This is a placeholder abstract. The whole template is used in semester projects at Aalborg University (AAU).

1 Introduction

In this section we present some introductory ways to use the tools within LaTeX in general, and this template in particular. For example, this is a citation [1], while this is a multi-citation[1, 2].

The column width of the IEEE template is 3.5 inches, so if you generate your plots with this width or less, the output will be the best. For example, Listing 1 contains the code to generate the image in Figure 1 using Python with matplotlib, and exported as pgf (TeX).

```
import matplotlib.pyplot as plt

plt.rcParams.update({
    "pgf.texsystem": "pdflatex",
    "font.family": "serif",  # use serif/main font for text elements
    "pgf.preamble": "\n".join([
         r"\usepackage[utf8x]{inputenc}",
         r"\usepackage[T1]{fontenc}",
    ]),
})

fig, ax = plt.subplots(figsize=(3.5, 3.5))

ax.plot(range(5))
ax.text(0.5, 3., "serif")
ax.text(0.5, 2., "monospace")
ax.text(2.5, 2., "sans-serif")
ax.set_xlabel(r"µ is not $\mu$")

fig.tight_layout(pad=.5)
fig.savefig("graph.pgf")
```

Listing 1. Code to generate the graph.pgf

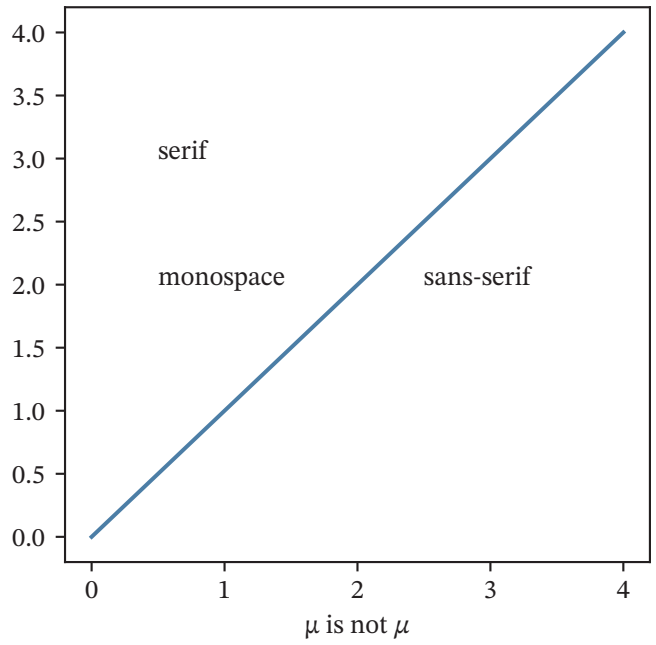

Fig. 1. An example graph drawn using Python's matplotlib library.

1.1 Tables and Figures

1.2 Algorithms, Theorems, and Proofs

There are a few different things outside the normal figure and table floats that are very relevant when writing a scientific paper or article. For example, you may wish to typeset theorems as in Theorem 1.

Theorem 1 (Pythagorean theorem)**.** *This is a theorem about right triangles and can be summarized in the next equation*

$$x^2 + y^2 = z^2$$

Or ref like Theorem 1 Similarly, for proofs:

Proof. To prove it by contradiction try and assume that the statement is false, proceed from there and at some point you will arrive to a contradiction. □

Note that proofs are not a numbered environment, and as such can't be referenced by default.

Acronyms

AAU Aalborg University. 1

- *All authors are with the Dept. of Computer Science, Aalborg University, Aalborg, Denmark*
- *E-mails: *saahol20, †leha20, ‡dpet20 @student.aau.dk*

TABLE 1
Example of a pretty, twocolumn table.

	Klasser				
Hændelser	Reservation	Gæst	Borgerforening	Kalender	Betaling
Anmodet	✓	✓	✓		
Godkendt	✓		✓		
Afvist	✓		✓		
Redigeret	✓	✓	✓		
Annulleret	✓	✓	✓		✓
Betalt					✓
Refunderet					✓
Kvitteret		✓	✓		
Registreret	✓			✓	
Påmindet		✓	✓		

INSERTION-SORT(A, n)

```
1  for i ← 2 to n
2      key ← A[i]
3      // Insert A[i] into the sorted subarray A[1 : i − 1].
4      j ← i − 1
5      while j > 0 and A[j] > key
6          A[j + 1] ← A[j]
7          j ← j − 1
8      A[j + 1] ← key
```

Algorithm 1. Test

REFERENCES

[1] M. Goossens, F. Mittelbach, and A. Samarin, *The LaTeX Companion*. Reading, Massachusetts: Addison-Wesley, 1993.

[2] G. D. Greenwade, "The Comprehensive Tex Archive Network (CTAN)," *TUGBoat*, vol. 14, no. 3, pp. 342–351, 1993.

APPENDIX A
COMPILING IN DRAFT

You can also compile the document in draft mode. This shows todos, and increases the space between lines to make space for your supervisors feedback.