Universität Hamburg
Department Informatik
Knowledge Technology, WTM

Neural Networks for Artificial Agents

Seminar Paper

Knowledge Processing with Neural Networks

Horst Hansen

Matr.Nr. 6543210

hansen@informatik.uni-hamburg.de

01.04.2014

Abstract

This paper gives a brief overview and an example of how to write a seminar paper in LaTeX. Seminar papers are often seen as a review of an area research or as an overview over several approaches for a given problem. An "Abstract" serves as a complete summary and teaser of the paper: What is it all about? What is the open problem? What are possible solutions? What is the (abstract) result of this paper? — Usually you (re-)write the Abstract as the last step of your paper writing.

Contents

1   Introduction

Object recognition and coherent object representation have been major hurdles in developing efficient artificial vision systems. Invariant object recognition forms the core of the problem of developing egocentrical object based representations of the external world. Given the incredible ability of the biological vision systems which exhibit invariance to considerable amount of deformations, it is natural to take inspiration from biological vision systems to build artificial vision systems which can perform invariant object recognition. In this paper, we evaluate different hierarchical models which attempt to mimic the cortical circuit design and the cortical architecture found in the neocortex of the brain to achieve object recognition. In the first section, we discuss the topic of object recognition and the challenges faced by Artificial Vision systems which try to achieve this goal. In the second section, a brief summary of design principles of cortical computing is presented along with a model (insert citation) linking the designs of cortical computing to behavioral properties of various forms of biological intelligence. In section 3, we evaluate different biologically inspired models for object recognition. In section 5, we provide a comparative evaluation of these models with the cortical architecture model of the neocortex. In section 6, we discuss future directions of research in cortical computing and object recognition.The introduction motivates the research question. Ideally it describes the field, the specific open problem, why this is important, and – most importantly – what answer/approach/idea could possibly solve the problem. Keep in mind: Already in the introduction, every claim or idea that is not your (the author's) claim/idea needs a reference!

In addition, the introduction outlines the main ideas of the following paper and what are the main contributions of the paper. Remember: The main goal of the seminar paper is NOT to repeat the content of a textbook, but to provide an OWN view on different very recent solutions for an open problem.

If the paper has more than 4 pages, a reader's guide is recommenced. In a short paragraph an outline of the content of the next sections.

2   Optional: Background Information

A brief section giving background information may be absolutely necessary, especially if your work spans across two or more traditional fields. That means that your readers may not have any experience with some of the material needed to follow your paper, so you need to provide the most important foundations. A different title than that given above is usually better; e.g., "A Brief Review of Frammis Algebra."

3   Models/Approaches/Methods Descriptions

After the (one or maybe two) common section(s) Introduction (and optional Background), more sections with the actual content of a paper follow. The style and

structure of such sections varies by a large degree, no general rules of thumb can be given. However it is very important to describe each model/approach/method with respect to your research question: How can this model/approach/method solve the open question?

All sources must be properly referenced, ideally by using the BiBTeX system. References can then be very conveniently made with the CITE command. For example, reference [**?**] discusses some of the elementary rules on writing scientific papers, amongst others how to correctly cite other documents. Reference [**?**], e.g., describes how to correctly use the SI system of units and their correct typographical representation. In general you organise this section(s) by idea, and not by author or by publication.

For a good seminar paper you should end up having a number of approaches described that you can compare afterwards. Also in this section, the title of the section should be very meaningful and ideally name the proposed model/approach/method.

3.1 Word processing with LaTeX

This document already has introduced the most important constructs of LaTeX. What is necessary to produce documents with LaTeXis simple any normal text editor and a LaTeXdistribution. This is commonly installed on practically all UNIX-type systems; for Windows, an excellent LaTeXexists, called MikTeX, available from `www.miktex.org`. Almost all distributions come with a large patch of examples and introductory material; consult your local installation for details.

Lots of supplementary and background information, FAQs, etc. is available from the Comprehensive TeX Archive Network (CTAN); the German mirror of which is `www.dante.de`.

3.2 Tables in LaTeX

Tables should be centred and should always have a caption positioned above it. A caption in a sentence form as well as in a short form must end with a period as seen in table **??**. Ideally the table can be understood sorely by the table and the caption itself. The parameters "hbtp" provide a list of priorities for the arrangement of the table: here, bottom, top, (next) page.

Table 1: This caption has one line so it is centred.

Example column 1	Example column 2
Example text 1	Example text 2

3.3 Figures in LaTeX

Note that a figure is a so-called floating object: it is moved around the actual text in order to best fit on a page. This is in strong contrast to some GUI-based word

processing tools, where the placement of figures is usually more associated with luck than principle.

As figures float around, expressions like "the following figure" must never be used. Instead, figures need a caption, a label, and must be properly referenced in the main text. A figure caption is placed centred below the figure and describes the figure in (very) short. Again, ideally the figure can be understood sorely by the figure and the caption itself.

In general, only vector graphics in encapsulated postscript (EPS) or a similar format (SVG, PDF) should be included in any kind of text, as this allows arbitrary scaling, rotation etc. without any loss of quality. Bitmap formats (JPEG, GIF, . . .) should only be used if no other alternative exists — basically the only case where bitmaps can be justified is when scanned pictures need to be included in a text, however, this should be avoided as hard as possible as the quality in usually not satisfactory. If a screen shot is needed a high resolution picture without visible fragments of a jpeg compression is allowed. Figures like the figure **??** (this is how you refer to figures correctly!) should always appear after the first referencing it.
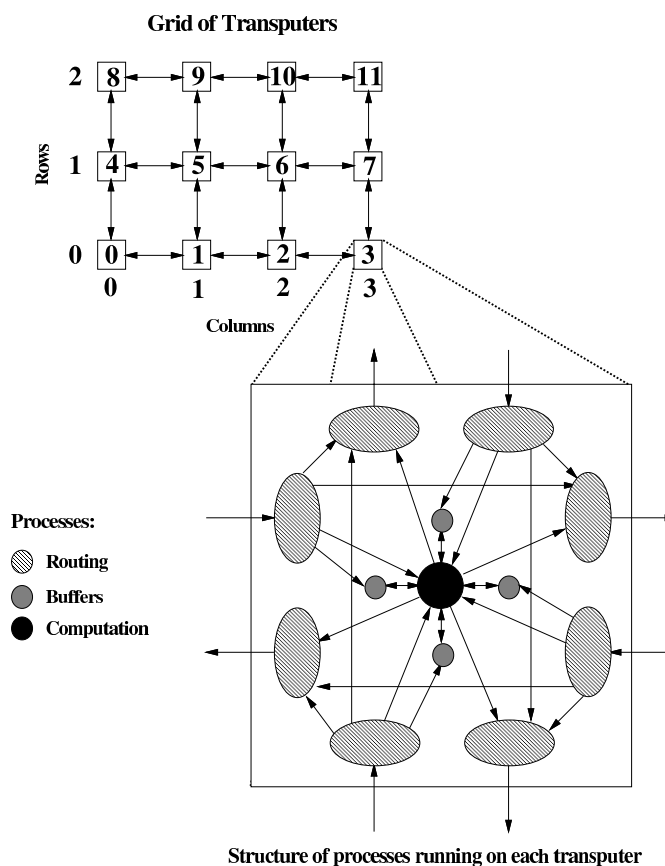

Figure 1: Network of transputers and the structure of individual processes.

4

4 Models/Approaches/Methods Analysis and Comparison

The analysis the proposed models/approaches/methods descriptions is a much more free-form of a paper. Starting with a comparison of several approaches over some experimental settings and result up to a theoretical verification of the model(s), anything is allowed. But it all should only serve one purpose: to convince the reader of the right to exist of the described models/Approaches/methods. For a seminar paper this is the most important section and your (the author's) own contribution!

5 Conclusion

At the end, there is a final section concluding and summarizing a paper, putting the entire work into perspective and explaining, on a larger level, what the consequence of the models/approaches/methods are and how this answers the research question that has been raised in the introduction. Also, unexpected results can be discussed here, etc.