Logic for Computer Science

A Practical Approach

Andrea Cacioli

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1. Logic as a field of study

1.1 Motivation

I am a human. As such I tend to reason following what we call logic. Logic is the foundamental layer that is behind human reasoning. Some say it probably is the most foundamental feature that makes us humans and that it actually defines us more than how much writing does. After all, it is reasonable that people started thinking before they started writing. Studying the logic is much like studying computer science as in both activities you explore the way you would solve a problem yourself and then you try to extract the basic steps that lead you to the solution. Unlike when writing a program though, in logic we are not faced with the dreadful experience of dealing with a compiler, which is the most pedantic and obnoxious thing about software as much as it is the most useful tool. For this reason, I would argue that logic, even though it is considered to be incredibly hard and formal, it is in fact easier than writing programs as long as you manage to really uncover the internal processes of your brain in the most basic way possible, just like when you try to write an algorithm of any sort. With these premises, we are ready to adventure on a journey that will formalise our way of thinking and it will probably stick to your mind so much that you will feel like you could never do without it.

II Propositional Logic

2. Introduction

2.1 History

Propositional logic is a type of logic that was first used by Crysippus in ancient Greece, where it was used to first speak of logic as a subject. It was then brought on by the Stoics. It was different from the Aristotelian logic, also known as syllogistic logic, that instead relied heavily on the use of terms which we do not explore in this chapter. The original propotitional logic though did not survive the passing of time as the first books were already lost in the late antiquity. It was only in medieval times that, thanks to the french philosofer Peter Alebard that, we were able to basically redefine all the formalisms that were in used by the stoics. The final refinement was made by Leibniz and later by Boole, who you might know if you worked with any programming language, and De Morgan.

2.2 Features

Propositional Logic, as the name suggests, makes strong use of something called propositions. A proposition is a statement regarding something that can either be true or false. It is the relation between propositions that really is the subject of study.

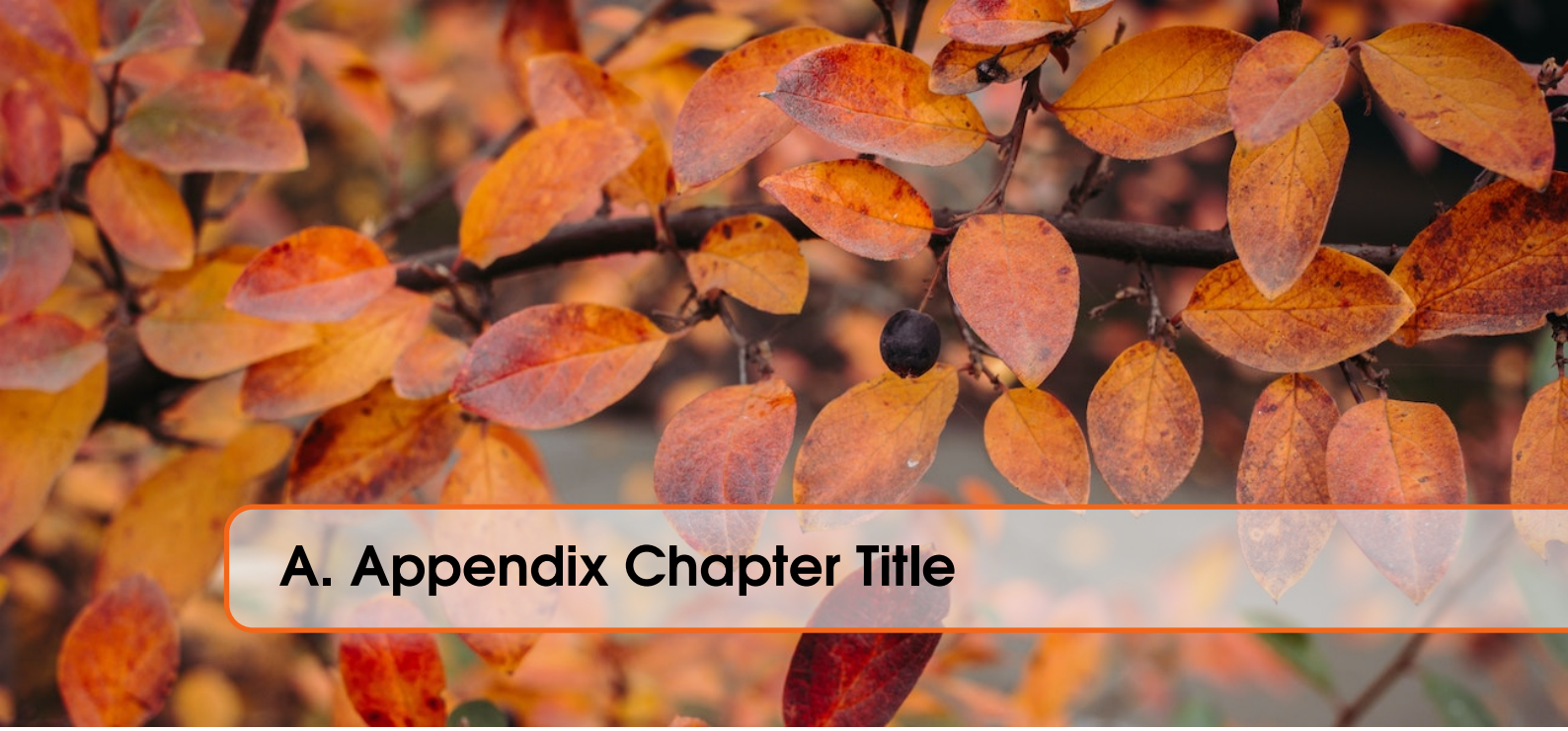
Let's take these two propositions as an example.

A : The sky is blue$B$: The number one seed NBA team is the Celtics

Bibliography

Articles

Books



A. Appendix Chapter Title

A.1 Appendix Section Title

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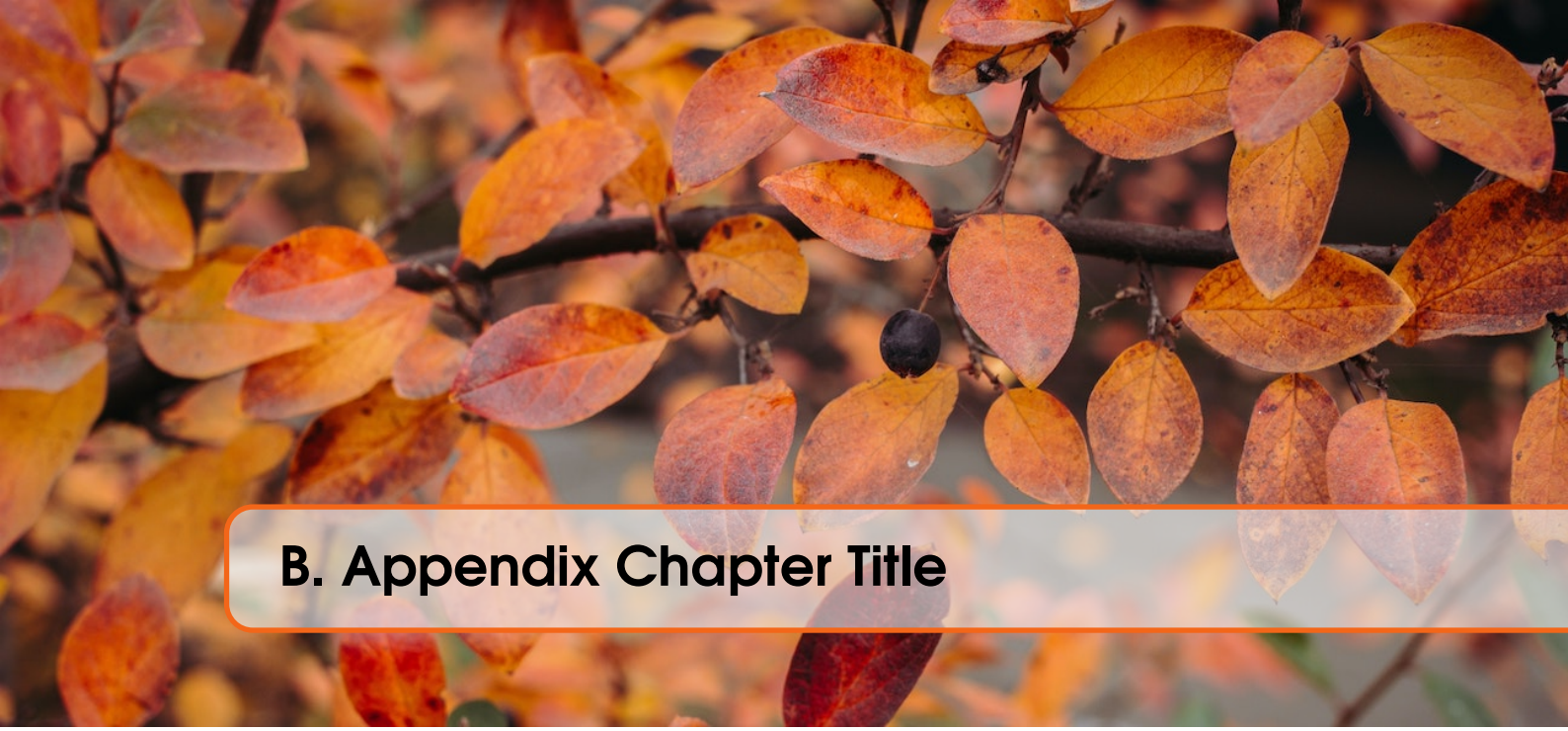

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