MACHINE LEARNING WITH RUST

A practical attempt to explore Rust and its libraries across popular machine learning techniques

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Prologue

Prior to starting this writing expedition, I had a clear but challenging objective: to discover how the language Rust, which is known for being fast and safe, can work with the constantly changing field of machine learning. This book was written out of a mix of interest and a strong desire to go where no one has gone before, mapping out the places where Rust and machine learning meet. It's more of an exploration and story of finding than a claim to mastery. As the author, I'm not inviting you on this journey as a perfect teacher, but as a fellow learner eager to find out what can be done by combining the strength of Rust with the flexibility of machine learning methods.

It was important to make it clear from the start that this book is not meant to be the only way to learn machine learning with Rust. It's more of a starting point or introduction for people who are interested in what Rust can do for machine learning projects. Sharing knowledge and trying new things is what these pages are all about. The goal is to get you interested and give you a base from which to build.

We start with the basics and show you how Rust works so that even people who are new to the language can see what it can do. The steps in the book are similar to how I learned Rust: from getting to know its syntax and features to looking into how its ideas can be used to make machine learning methods work better, they are similar.

The exploring spirit of this book stays true as we learn about different machine learning techniques, from basic algorithms to more complex neural networks. The datasets of COVID, CIFAR-10 and practical examples are meant to show the way by showing how Rust's features, such as its speed, memory safety, and concurrency, can be used to deal with the problems that come up in machine learning projects.

The main idea of this book is to ask questions, learn, and discover what hasn't been explored before. Developers and experts alike think that combining Rust and machine learning can lead to new discoveries. Although there are technical details, the story does not present them as a declaration of knowledge. Instead, it does so as a conversation, encouraging you to try new things, dig deeper, and help us learn more.

Finally, I want to recommend this book to anyone who is interested in what can happen when Rust and machine learning come together. It opens the door to new ideas by showing how the rules of a systems programming language can be combined with machine learning to encourage new ideas. As we turn the pages together, let's start this journey with an open mind and a desire to learn, ready to discover the huge possibilities that lie ahead. At any point, you encounter correction, please do not forget to highlight them up to us at support@gitforgits.com

Content

Preface

In this stimulating book, you'll learn how to use the Rust programming language in conjunction with machine learning. It's not a full guide to learning machine learning with Rust. Instead, it's more of a journey that shows you what's possible when you use Rust to solve machine learning problems. Some people like Rust because it is quick and safe. This book shows how those qualities can help machine learning a lot.

To begin, we will show you what Rust is and how it works. This is so that everyone, even those who are new to Rust, can follow along. Then, we look at some basic machine learning concepts, such as linear and logistic regression, and show how to use Rust's tools and libraries to make these ideas work.

You will learn more complex techniques like decision trees, support vector machines, and how to work with data as we go along. It goes all the way up to neural networks and image recognition, and we show you how to use Rust for these types of tasks step by step. We use real-world examples, such as COVID data and the CIFAR-10 image set, to show how Rust works with issues that come up in the real world.

This book is all about discovery and experimentation. To see what you can do with them, we use various Rust tools for machine learning. It's a fun way to see how Rust can be used in machine learning, and it will make you want to try new things and learn more on your own. This is only the beginning; there is so much more to uncover as you continue to explore machine learning with Rust.

In this book you will learn how to:

- Exploit Rust's efficiency and safety to construct fast machine learning models.
- Use Rust's ndarray crate for numerical computations to manipulate complex machine learning data.
- Find out how Rust's extensible machine learning framework, linfa, works across algorithms to comprehend the ecosystem.
- Use Rust's precision and speed to construct linear and logistic regression.
- See how Rust crates simplify decision trees and random forests for prediction and categorization.
- Learn to implement and optimize probabilistic classifiers, SVMs and closest neighbor methods in Rust.
- Use Rust's computing power to study neural networks and CNNs for picture recognition and processing.

- Apply learnt strategies to COVID and CIFAR-10 datasets to address realistic problems and obtain insights.

Prerequisites

This book is for aspiring Rust programmers, newbies to machine learning, and to machine learning professionals who want to witness the possibilities of Rust in machine learning. The book just expects you to be eager to explore Rust in machine learning and no other thing is desired to pull this book.

Codes Usage

Are you in need of some helpful code examples to assist you in your programming and documentation? Look no further! Our book offers a wealth of supplemental material, including code examples and exercises.

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We are happy to assist and clarify any concerns.

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Chapter 1: Rust Basics for Machine Learning