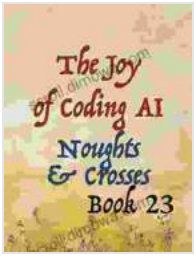
Master Noughts and Crosses with Artificial Intelligence and p5.js

Prepare yourself for a thrilling journey into the realm of artificial intelligence (AI) and game development as we delve into the captivating world of Noughts and Crosses (also known as Tic-Tac-Toe). This comprehensive guide will equip you with the knowledge and skills to build an AI-powered Noughts and Crosses game using the power of p5.js, a popular JavaScript library for creative coding.



The Joy of Coding Book 23: AI plays Noughts and Crosses with p5.js by E. R. Davies

★★★★★ 5 out of 5

Language	: English
File size	: 8716 KB
Text-to-Speech	: Enabled
Screen Reader	: Supported
Enhanced typesetting	: Enabled
Print length	: 135 pages
Lending	: Enabled
Paperback	: 26 pages
Item Weight	: 3.04 ounces
Dimensions	: 8.25 x 0.07 x 6 inches

Whether you're a seasoned programmer or just starting your coding adventure, this guide will empower you to master the fundamentals of AI and game development while having an absolute blast. Get ready to outsmart your opponents, dominate the game, and unlock the secrets of creating intelligent and engaging AI experiences.

Chapter 1: Understanding Noughts and Crosses

Before we dive into the world of AI and p5.js, let's establish a solid foundation by understanding the basics of Noughts and Crosses.

- **Objective:** The goal of Noughts and Crosses is to align three of your symbols (either noughts or crosses) in a horizontal, vertical, or diagonal row before your opponent does.
- **Gameplay:** The game is played on a 3x3 grid. Players take turns placing their symbols in empty cells until one player achieves the objective or a stalemate occurs.
- **Rules:** Players alternate turns, with one player using noughts and the other using crosses. Once a cell is occupied, it cannot be overwritten.

Chapter 2: Introducing p5.js

Now that we have a firm grasp on the rules of Noughts and Crosses, let's meet p5.js, our trusty ally in creating the game's visual interface and handling user input.

p5.js is an open-source JavaScript library specifically designed for creative coding. It provides a user-friendly API that makes it easy to create interactive graphics, animations, and simulations.

Getting Started with p5.js

1. **Include the p5.js Library:** Add the following line to the `<head>` section of your HTML document:

```
<script
src="https://cdnjs.cloudflare.com/ajax/libs/p5.js/1.5.0/p5.j
```

`</script>`

2. **Create a p5.js Sketch:** Inside the `<body>` section, create a `<script>` block and define your p5.js sketch:

```
<script> function setup(){}
```

```
function draw(){}</script>
```

3. **Run the Sketch:** Once your sketch is defined, simply open the HTML file in a web browser to run the game.

Chapter 3: Building the Game Interface with p5.js

Armed with our understanding of p5.js, let's embark on the exciting task of creating the game interface for our Noughts and Crosses game.

Creating the Game Board

To create the game board, we'll use p5.js's `rect()` function to draw a 3x3 grid of squares.

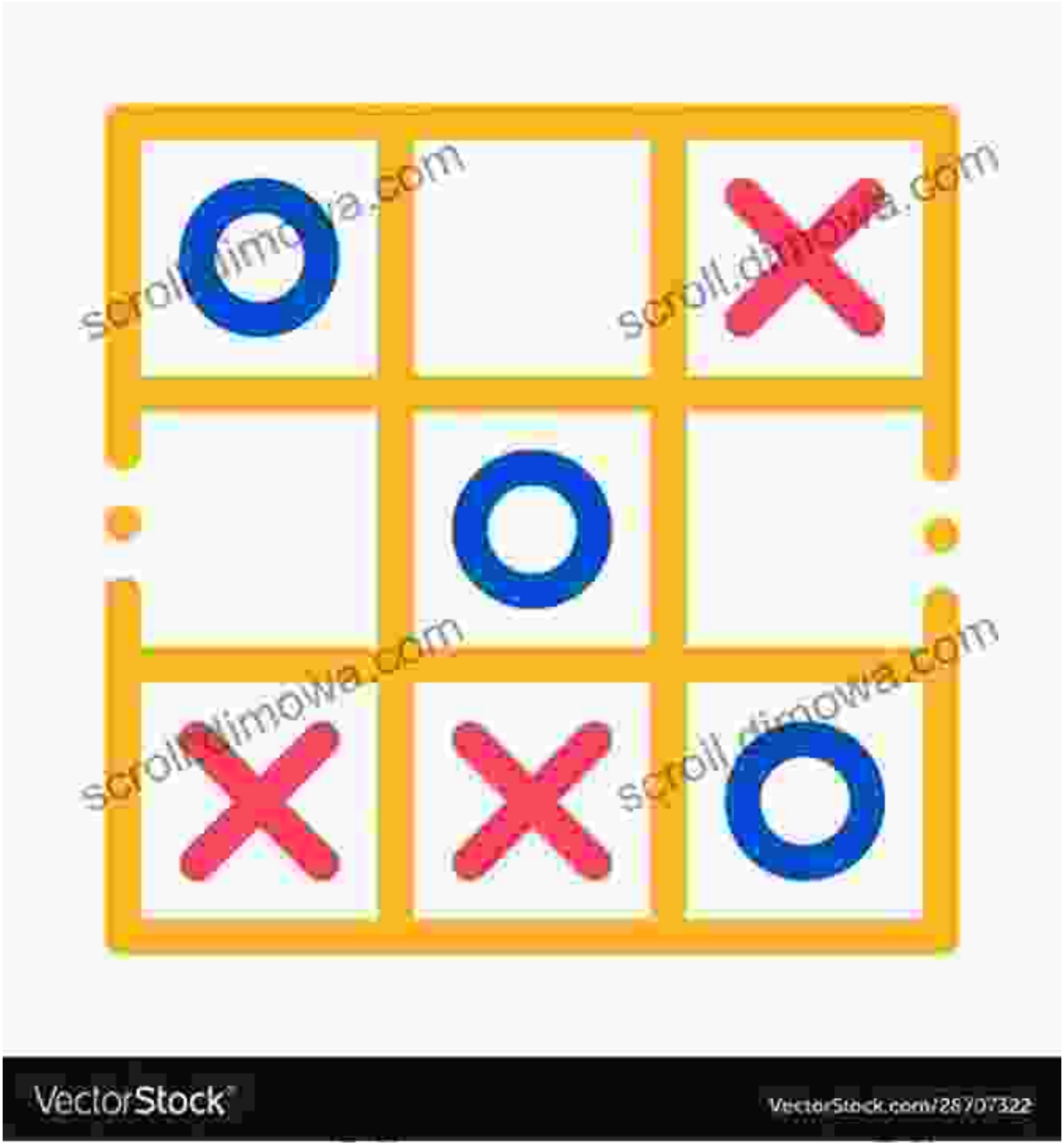
```
function setup(){createCanvas(400, 400); background(255); strokeWeight(4); line(0, 133, 400, 133); line(0, 266, 400, 266); line(133, 0, 133, 400); line(266, 0, 266, 400); }
```

Adding Player Symbols

Next, we'll use p5.js's `ellipse()` and `line()` functions to add the player symbols (noughts and crosses) to the game board.

```
function draw(){if (mouseIsPressed){const x = mouseX; const y = mouseY; if (x > 0 && x 0 && y 133 && x 0 && y 266 && x 0 &&
```

```
y 0 && x 133 && y 133 && x 133 && y 266 && x 133 && y 0 && x 266 && y 133 && x 266 && y 266 && x 266 && y
```



Chapter 4: Implementing AI with Minimax Algorithm

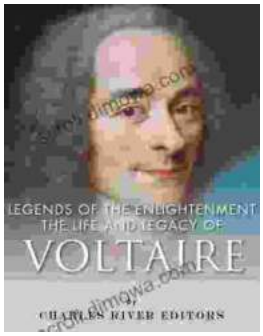
Now comes the exciting part: bringing our Noughts and Crosses game to life with the power of AI.

We'll employ the Minimax algorithm, a classic AI technique, to create an intelligent AI opponent that can evaluate the game state and make strategic moves.

Understanding Minimax

Minimax is a recursive algorithm that evaluates all possible game states and chooses the move that leads to the best possible outcome for the AI.

The algorithm works by assigning a score to each possible move based on how likely it is to lead to a win for the AI



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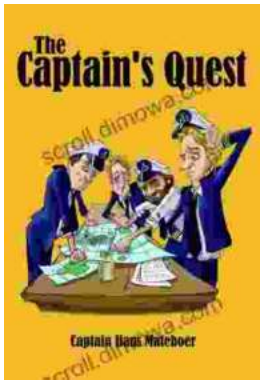

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