Aprendizaje Reforzado

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Preface

This is a Quarto book.

To learn more about Quarto books visit https://quarto.org/docs/books.

```
import numpy as np

x = 10
```

% Vista preliminar cuerpo

$$\begin{aligned}\nu(x) &= \max_{a \in A(x)} \{c(x,a) + \nu(f(x,a))\} \\ &= \max_{a \in A(x)} \left\{a^2 + x^2 + E\left[\nu(x + a + \xi)\right]\right\}\end{aligned}$$

Para $\nu(x) = ax^2 + b$

$$\begin{aligned}\nu(x) &= \max_{a \in A(x)} \{c(x,a) + \beta E\left[\nu(f(x,a))\right]\} \\ &= \max_{a \in A(x)} \left\{A^2 + x^2 + \beta\left(E\left[a\left(f^2(x,a)\right)\right] + b\right)\right\} \\ &= \max_{a \in A(x)} \left\{A^2 + x^2 + \beta\left(aE\left[f^2(x,a)\right] + b\right)\right\}\end{aligned}$$

Notemos que

$$\begin{aligned}E\left[f^2(x,a)\right] &= E\left[(x + A + \xi)^2\right] \\ &= E\left[x^2 + A^2 + \xi^2 + 2xA + 2x\xi + 2\xi A\right] \\ &= x^2 + A^2 + E\left[\xi^2\right] + 2xA + 2xE\left[\xi\right] + 2AE\left[\xi\right] \\ &= x^2 + A^2 + d + 2xA\end{aligned}$$

Entonces

$$\begin{aligned} ax^2 + b &= \max_{a \in A(x)} \left\{ A^2 + x^2 + \beta \left[a \left(x^2 + A^2 + d + 2xA \right) + b \right] \right\} \\ &= \max_{a \in A(x)} \left\{ A^2 + x^2 + \beta a \left(x^2 + A^2 + d + 2xA \right) + \beta b \right\} \\ &= \max_{a \in A(x)} \left\{ A^2 + x^2 + \beta a x^2 + \beta a A^2 + \beta a d + 2\beta a x A + \beta b \right\} \\ &= \max_{a \in A(x)} \left\{ A^2 \left(\beta a + 1 \right) + 2\beta a x A + x^2 + \beta a x^2 + \beta a d + \beta b \right\} \end{aligned}$$

Definimos

$$w\left(x, A\right) = A^2 \left(\beta a + 1 \right) + 2\beta a x A + x^2 + \beta a x^2 + \beta a d + \beta b,$$

entonces

$$\partial_A w = 2A \left(\beta a + 1 \right) + 2\beta a x.$$

Si $\partial_A w = 0$, entonces

$$A = -\frac{\beta a x}{\beta a + 1}$$

Entonces

$$\begin{aligned} \nu\left(x\right) &= \left(\beta a x \right)^2 - 2\frac{\left(\beta a x \right)^2}{\beta a + 1} + x^2 + \beta a x^2 + \beta a d + \beta b \\ &= x^2 \left(\left[\beta a \right]^2 - 2\frac{\left(\beta a \right)^2}{\beta a + 1} + 1 + \beta a \right) + \beta a d + \beta b \end{aligned}$$

Entonces

$$\begin{aligned} a &= \left[\beta a \right]^2 - 2\frac{\left(\beta a \right)^2}{\beta a + 1} + 1 + \beta a \\ b &= \beta a d + \beta b, \end{aligned}$$

de forma rapida

$$b = \frac{\beta a d}{1 - \beta},$$

entonces queda pendiente calcular a

$$
\begin{aligned}
a &= [\beta a]^2 - 2\frac{(\beta a)^2}{\beta a + 1} + 1 + \beta a. \\
0 &= (\beta a)^2 \left(1 - \frac{2}{\beta a + 1}\right) + 1 + (\beta - 1)\, a \\
&= (\beta a)^2 (\beta a + 1 - 2) + \beta a + 1 + (a\beta - a)(\beta a + 1) \\
&= (\beta a)^2 (\beta a - 1) + \beta a + 1 + \left[(a\beta)^2 + a\beta - \beta a^2 - a\right] \\
&= (\beta a)^3 + 2a\beta + 1 - \beta a^2 - a \\
&= \beta^3 a^3 - \beta a^2 + (2\beta - 1)\, a + 1
\end{aligned}
$$

1 Introduction

This is a book created from markdown and executable code.

See Knuth (1984) for additional discussion of literate programming.

2 Summary

In summary, this book has no content whatsoever.

References

Knuth, Donald E. 1984. “Literate Programming.” *Comput. J.* 27 (2): 97–111. https://doi.org/10.1093/comjnl/27.2.97.