

# CartPole v0

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## Overview

### Details

Name: CartPole-v0

Category: Classic Control

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### Description

A pole is attached by an un-actuated joint to a cart, which moves along a frictionless track. The pendulum starts upright, and the goal is to prevent it from falling over by increasing and reducing the cart's velocity.

### Source

This environment corresponds to the version of the cart-pole problem described by Barto, Sutton, and Anderson

## Environment

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## Observation

Type: Box(4)

Num	Observation	Min	Max
0	Cart Position	-2.4	2.4
1	Cart Velocity	-Inf	Inf
2	Pole Angle	$\sim -41.8^\circ$	$\sim 41.8^\circ$
3	Pole Velocity At Tip	-Inf	Inf

## Actions

Type: Discrete(2)

Num	Action
0	Push cart to the left
1	Push cart to the right

Note: The amount the velocity is reduced or increased is not fixed as it depends on the angle the pole is pointing. This is because the center of gravity of the pole increases the amount of energy needed to move the cart underneath it

## Reward

Reward is 1 for every step taken, including the termination step

## Starting State

All observations are assigned a uniform random value between  $\pm 0.05$

## Episode Termination

1. Pole Angle is more than  $\pm 20.9^\circ$
2. Cart Position is more than  $\pm 2.4$  (center of the cart reaches the edge of the display)
3. Episode length is greater than 200

## Solved Requirements

Considered solved when the average reward is greater than or equal to 195.0 over 100 consecutive trials.