Course Project

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Abstract

For this course (CSCI 3010) we were tasked with creating a program of some sort which is able to apply and demonstrate key course content. We achieved this by creating a program that simulates a pachinko-like game that uses falling balls that bounce off of static pegs on a two dimensional plane. This focuses on the concept of collision detection and response.

Introduction

We created our program using the Python programming language. Our program uses libraries such as `pygame`, `sys`, `random`, `os`, `numpy`, `scipy.integrate` and `time`. The program is started by running the single python file `3010_project.py`. The python file uses external resources available to it in its folder, such as file images. The program is a single window that can be exited by pressing ‘q’, or by completing the goals within the game, where it automatically exists.

Game Mechanics

Our game is based off of the popular puzzle game Peggle where you drop balls down a pattern of pegs and try to get the balls into goals to get points. Using the left and right arrows you can move the ball to your desired position before dropping it using the spacebar. The ball will then drop down and bounce off of the predetermined pegs. Five random goal locations are spawned at the bottom of the pegs and when a ball hits it you get a point. The user has 10 balls in total to try to get up to five points.

Mathematical Concepts

We used collision detection and collision response as our main mathematical concepts to demonstrate in our project. We also used basic two dimensional physics. For our physics, we coded an updating system where there is a 2D universe (`World` class) which holds objects (`Disk2D` class) that have their own states which include their positions and velocities in the x and y planes.