The Use of Neural Networks and Deep Learning in the Development of a Realistic Physics Engine

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***Abstract*—In the following paper, we will examine the process of developing a functional physics engine while making use of an Artificial Neural Network. Specifically, we will focus on predicting the path of motion of a ball, when thrown at varying initial speeds and angles. We will also develop a data set containing a number of videos, each with a ball thrown at a different starting speed and angle, and will make use of this as we develop our model. While we will be applying it to a constant ball, further work can expand this to objects with different mass, shape, etc.**

I. Introduction

Using an ANN to develop a model that can predict a ball's path of motion using real video data, and with starting speed and angle provided as arguments

II. Methodology

A. Data Collection

Firstly, we begin with our data collection. Our project will make use of real-world videos taken by us. Each video will consist of a ball being thrown at different angles and speeds. We will use the same ball, and as such, differences in elasticity, mass, etc, will not be factored into our mode

B. Analysis

We plan to analyze our data through a number of methods. . We will firstly locate the object we are tracking [1]

- **Speed:** Our speed data point will hold the value of the object's speed at an instant. We will extrapolate this speed from each frame using a number of methods [1].
- **Angle:** Our angle data point will hold what angle the ball is at relative to the positive horizontal axis. We will extrapolate this angle from each frame using a number of methods [2].
- **Time:** Our time data point will simply be extracted from the video information at the snapshot of the current frame. We will also save our initial speed and angle as a data point, since they will prove useful. [3]

C. Modeling

We will make use of our newly created data set in our model development. Making use of an Artificial Neural Network [2], we will calculate a model that will predict the rest of a ball's motion, while only making use of the starting speed and angle.

We will graph this information on a vector field, and will also develop a GUI of sorts that will allow for fast experimentation.

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References

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