**Simulating the Spread of an Infectious Disease using the SIR Model**

**Introduction**

This document outlines a Python implementation of the Susceptible-Infectious-Recovered (SIR) model for simulating the spread of an infectious disease. The SIR model is a model widely used in epidemiology to understand the dynamics of infectious diseases within a population. The implementation employs the NumPy library for numerical operations and Matplotlib for visualization.

**Model Description**

The SIR model divides the population into three compartments:

* Susceptible (S): Individuals who are not infected but can become infected.
* Infected (I): Individuals who are currently infected and can spread the disease.
* Recovered (R): Individuals who have recovered from the infection and are assumed to be immune.

The model uses the following set of ordinary differential equations:

A diagram of a mathematical equation

Description automatically generated

* S = number of susceptible individuals.
* I = number of infected individuals.
* R = number of recovered individuals.
* β = infection rate
* γ = recovery rate
* dt = total population

**Implementation**

The Python implementation uses the provided equations to simulate the progression of the disease over a specified number of days. The simulation considers a basic scenario without external factors influencing the spread of the disease.

The Python implementation consists of a function sir\_model that simulates the SIR model over a specified time period. The simulation results are visualized using Matplotlib and the simulation is based on the provided parameters:

* infection\_rate
* recovery\_rate
* population
* initial\_infected
* days

**Example**

The code simulates the spread of an infectious disease over 100 days with initial conditions and default parameters.

You can customize the parameters and analyze the results to gain insights into the potential spread and impact of the infectious disease within a population.