Fake News Simulator

Goals & Purpose

The purpose of the program is to provide the user an easy interface for simulating the dissemination and consumption of fake news. It will provide the user with a brief description of the simulation and its parameters and ask the user to adjust variables as they so desire. It will then run the simulation and output the results (belief in fake news over time) in a chart.

General Design Overview

This project consists entirely of objects, with instances of each class object being created dynamically. The complexity of the project is sufficient, because it takes into account a large variety of inputs and due to the interactiveness between objects.

Using the main class simulator, the simulator begins by taking in user inputs, which is the interactive component of the project. After gathering all user inputs, it begins creating instances of the news, people, distributors, and network classes based on the input parameters; attributes of these instances (credibility, polarization, etc.) will follow normal distributions as they likely do in the real world. After creating all of the instance objects, the simulator will assign each instance to an associated group based on similar polarization characteristics and along with some randomness. News articles will be assigned to distributors and people will be assigned to distributors and networks.

After all of the simulation preparation is complete, the simulator object will call the time_step method. Each time interval will follow rounds of distribution, consumption, re-distribution (person-to-person distribution), and re-consumption. Belief in fake news will be tracked at each time interval and once time expires, these results will be plotted on a line graph and displayed for the user.

Classes

Simulator

Simulator is the main class of the program. It acts as the user interface and will be used to create all of the objects based on the input parameters, run the simulation, graph the results, and display the results.

Attributes:

- *Class Attributes:*
    - sys.stdout (used to unbuffer outputs in console)
    - welcome
    - ranges
- *Instance Attributes:*
    - is_error
    - time (duration of test)
    - time_left
    - num_people
    - num_news

    - fake_percentage
    - num_fake
    - num_real
    - num_media
    - num_networks
    - sim_history

Methods:

- __init__
    - gathers all user inputs
- simulate
    - inputs:
        - note: uses instance attributes as inputs
    - outputs:
        - runs entire simulation meaning everything is technically an output of this method and sets all necessary class attributes
        - line charts plotting belief in fake news over time along with distribution of news over time
- check_input
    - inputs:
        - user_input, low, high
    - outputs:
        - adjusts is_error and outputs appropriate error message
- create
    - inputs:
        - note: all inputs are provided by user from init call
        - num_people, num_news, fake_percentage, num_distributors
    - outputs:
        - distributor instances, people instances, news instances, network instances
        - object group assignments
- time_step
    - inputs:
        - time, distributor_list, network_list, people_list
    - outputs:
        - time_left, fake_news_belief_count, fake_distribution_count, real_distribution_count, adjusts sim_history
- log
    - inputs:
        - time_step
    - Outputs:
        - tracks all results at each time step
- plot

    - inputs:
        - time, sim_history
    - outputs:
        - line charts displaying belief in fake news over time along with news distribution over time

Distributor

The Distributor class is an abstract base class representing all types of distributors.

Attributes:

- class attributes
    - fakes_shared
    - real_shared
- instance attributes
    - uid
    - polarization
    - credibility

Methods

- distribute
    - abstractmethod
- track_news_shared
    - classmethod
    - inputs:
        - news object
    - outputs:
        - increments fakes_shared and real_shared depending on input

Media

The Media class is a subclass of distributor. The represented typical media/new organizations who distribute news to consumers.

Attributes:

- class attributes
    - num_rounds
    - news_uid
    - extreme (set of extreme media distributors)
    - moderate (set of moderate media distributors)
    - weak (set of weak media distributors)
    - media
    - weak_pol_dist

    - moderate_pol_dist
- instance attributes
    - super()__init__(uid, polarization, credibility)
    - news
    - dist_network
    - fake_news_quantity
    - real_news_quantity
    - num_news
    - news_per_round

Methods

- Add_distributor
- add_person
- add_news
- create_news
    - inputs:
        - fake_news_batch, real_news_batch
    - outputs:
        - news object
- distribute
    - outputs:
        - distributes news uids to newsfeed for people in dist network

Person

Person is a subclass of distributor as they are able to distribute news as well, but are limited to distributing within their networks. People have certain other attributes that determine how much news they consume and what they believe.

Attributes

- class attribute
    - fake_news_belief
    - real_news_belief
    - persons
- instance attributes
    - super()__init__(uid, polarization, credibility)
    - alignment
    - consumption_pref (semi-randomized variable representing news consumption preference regarding quantity)
    - dist_network
    - newsfeed
    - news_to_share
    - news_consumed

Methods

- distribute (limited to networks)
    - outputs:
        - Adds each article in news_distribution_list to the news_consumption_list attribute of each person in network_list
- add_network
- add_to_newsfeed
- consume (when a user is distributed news, this method will be called and determine whether a person consumes the news, whether they believe it, and whether they will distribute it. The consumption will also affect their polarization, belief_pref, and consumption preferences.)
    - inputs:
    - outputs:
        - dist_network, self.polarization is adjusted, expands news_consumed
- adjust_polarization
    - inputs:
        - news object
    - outputs:
        - may adjust polarization based on news object
- track_belief
    - inputs:
        - news object
    - outputs:
        - tracks belief in real and fake news

<u>News</u>

The News class represents the news objects that will be distributed and consumed.

Attributes:

- class attributes
    - fake_distribution_count
    - real_distribution_count
    - news_media
    - fake_news_count
- instance attributes
    - uid
    - is_fake
    - polarization
    - alignment
    - credibility
    - distributed_count

Methods:

- track_distribution
    - classmethod
    - inputs
        - news object
    - outputs
        - tracks distribution of specific object

Network

The network class is a composition of Persons and determines who persons interact with. It will be created semi-randomly based on the amount of networks the user wishes to create and have users randomly assigned into each network.

Attributes

- class attributes
    - networks
- instance attributes
    - uid
    - persons
    - size

Unbuffered

This class enables the python program to run unbuffered to ensure the print statements execute properly across devices.

Attributes

- instance attributes
    - stream

Methods

- write
    - input:
        - string data
    - output:
        - writes to file
- writelines
    - input:
        - iterable data (strings)
    - output:
        - writes to file
- __getattr__
    - input:
        - expected attribute
    - output:
        - attribute for missing attribute