ISLAMIC UNIVERSITY OF TECHNOLOGY

Organization of Islamic Cooperation

Board Bazar, Gazipur

Assignment 02

CSE 4549

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# State Variables and Output Variables

The state variable is the number of remaining newspapers at the end the th date, . A positive value indicates that the demand was lower than the number of purchases, while a negative value indicates that the demand was higher than the number of purchases.

The output variables are:

* Average demand,
* Average revenue from newspaper sales,
* Average loss due to extra demand,
* Average revenue from scrap sales,
* Average loss due to scrap sales,
* Average profit,

# Events

* **Purchase** - This event occurs once per day, at the beginning of the day. It sets to the number of purchased newspapers.
* **Demand** - This event occurs multiple times throughout the day. It decrements by the demanded amount, potentially making it negative. It is possible to combine all the demand events together, since there are no other events in between different demand events. This will improve the performance of the simulation.
* **Scrap Sale** - This event occurs at most once per day, at the end of the day. It only occurs if the demand amount is smaller than the purchase amount. It causes to be set to .

# State Equations and Output Equations

To provide the state equation and output equations, we first need to clarify all the input variables and statistical counters. The statistical counters are updated at the end of each day, since it is assumed that the demand events have been combined.

## Input Variables

* The demand on the th day, . The equation for this is provided below.
* The purchase amount, . It is assumed that this is a fixed number for all days, provided as an input.
* The purchase price per newspaper, .
* The sale price per newspaper, .
* The scrap sale price per newspaper, .
* The loss due to excess demand per newspaper, .

## Statistical Counters

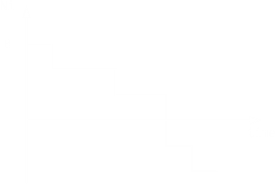
* Cumulative demand:
* Cumulative revenue from newspaper sales:
* Cumulative loss due to extra demand:
* Cumulative revenue from scrap sales:
* Cumulative loss due to scrap sales:
* Cumulative profit:

Each of the statistical counters corresponds to one of the output variables. The values for the output variables can be found at the end of the simulation by simply dividing the values for each corresponding statistical counter by .

## State Equation

# State Space

# Sample Path



# Event Routines

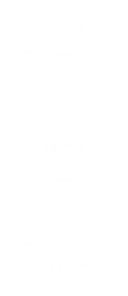
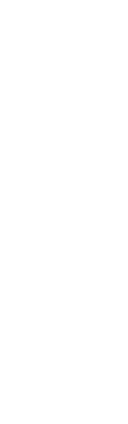
 

Fig: Purchase Event Fig: Demand Event

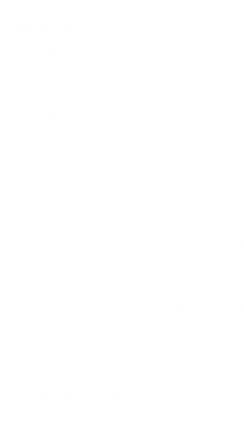


Fig: Scrap Sale Event

The demand event could be divided into separate events. However, this would make the system more complicated and would also decrease performance. It is unnecessary, since combining them makes no difference to the output results.

get\_demand is a separate function that generates a random number based on the probability distribution for provided in part (c).

# Statistical Variables

Flow charts have been provided for each of the statistical counters. Each flowchart simply makes a single decision based on the equations provided in part (c). The actual function that updates the statistical variables will call the functions for each of these flowcharts one after another.

