



Faculty of Computers and Artificial Intelligence – Cairo University

Problem II [Newspapers Seller]

Part 1

- **Problem formulation & Objective**
 - Problem is about newspaper seller who want to increase his profit through determining the optimal number of papers he should purchase.
 - The seller has four types of Newsday, “Excellent”, “Good”, “Fair”, and “Poor” with the following probabilities (0.18, 0.42, 0.32, and 0.08), respectively.
 - The buying price is 50 cents each and selling price is 70 cents.
 - There is a scrap if there are newspapers are not sold at the end of the day are sold as 15 cents.
 - Newspapers are purchased in bundles of 20.

The objective of our problem is to answer the following questions:

1. What the optimal number of papers the seller should purchase to increase his profit?
2. How does selling price of newspaper and of selling the unsold newspapers as a scrap affect your answer (the optimal number to purchase)?
3. How does the size of bundle used to purchase newspapers affect your answer (the optimal number to purchase)?

Part 2

- **System Components.**
 - Entity: Newspaper.
 - Attribute: Type of Newsday
 - Activity: buying newspaper.
 - State: number of sold newspapers at each day (“Excellent”, “Good”, “Fair”, and “Poor”).
 - Event: Newspapers not sold at the end of the day(scrap)

➤ **Table of generation of demand**

	demand probability distribution				Cumulative distribution				Random digit assignment			
demand	excellent	good	fair	poor	excellent	good	fair	poor	excellent	good	fair	poor
40	0.00	0.06	0.15	0.42	0.00	0.06	0.15	0.42	00-00	1-6	1-15	1-42
50	.07	.09	.22	0.28	0.07	0.15	0.37	0.7	1-7	7-15	16-37	43-70
60	0.08	0.16	.28	0.14	0.15	0.31	0.56	0.84	8-15	16-31	38-56	71-84
70	0.12	0.19	0.18	0.10	0.27	0.5	0.83	0.94	16-27	32-50	57-83	85-94
80	0.13	0.28	0.10	0.5	0.4	0.78	0.93	0.99	28-40	51-78	84-93	95-99
90	0.22	0.12	0.5	0.01	0.62	0.9	0.98	1	41-62	79-90	94-98	00-00
100	0.23	0.07	0.02	0.00	0.85	0.97	1	1	63-85	91-97	99-00	00-00
110	0.08	0.03	0.00	0.00	0.93	1	1	1	86-93	98-00	00-00	00-00
120	0.07	0.00	0.00	0.00	1	1	1	1	94-00	00-00	00-00	0-00

➤ **Table of generation of type of Newsday**

Type of Newsday	Probability	Cumulative probability	Random digit assignment
excellent	0.18	0.18	1->18
Good	0.42	0.60	19->60
fair	.32	0.92	61->92
poor	0.08	1	93>00

Maximum purchase 60.

Scrape price =15

Profit = revenue from sales – cost of newspapers – lost profit from excess

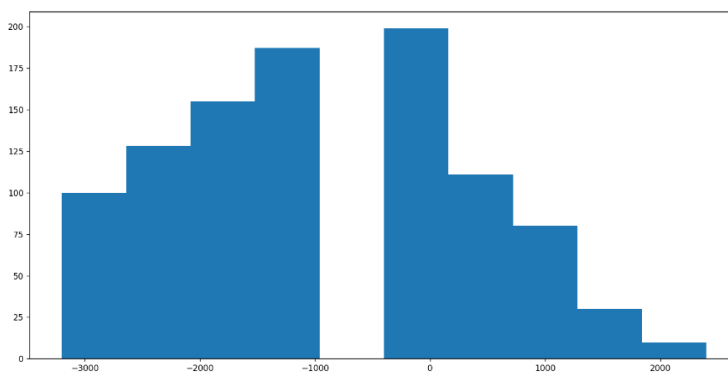
demand + salvage from sale of scrap papers

Calendar Table

Day	Random digits for type of Newscday	Type of Newscday	Random digit for demand	Demand	Revenue from sales (\$)	Lost profit from excess demand	Salvage from sale of scrap	Daily profit
1	16	excellent	10	60	\$42.00	-	-	12
2	90	Fair	15	40	\$28.00	-	3	1
3	25	Good	91	100	\$70.00	8	-	32
4	55	Good	70	80	\$56.00	4	-	22
5	70	Fair	98	90	\$63.00	6	-	27
6	13	Excellent	35	80	\$56.00	4	-	22
7	80	Fair	48	60	\$42.00	-	-	12
8	9	Excellent	19	70	\$14.00	2	-	-18
9	96	Poor	57	50	\$35.00	-	1.5	6.5
10	99	Poor	13	40	\$28.00	-	3	1

Part 3

- **Experimental Design Parameters: parameters that affects results of the output of our program.**
 - Revenue from sales.
 - Lost profit from excess demand.
 - Salvage from sale of scrap.
 - Daily profit.
- **Justification of experiment parameters values**
When we run 1000 days, the optimal number of purchase equal
And the
- **Results Analysis: Using graphs & discussions**



- **Conclusion**

With more trials of runs and increasing number of customers, this covers the greatest number of probabilities of our experiment to be near to the real-life values.
The seller would buy 60 to reach the most daily profit.

