SSN COLLEGE OF ENGINEERING
KALAVAKKAM-603110

STUDIO PROJECT - 2022

UCS2201 FUNDAMENTALS AND PRACTICES OF SOFTWARE DEVELOPMENT

MOVIE SCHEDULING IN A MULTIPLEX

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PROJECT GUIDE:

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ABSTRACT:

This project describes a model that generates weekly movie scheduling in a multiplex movie theatre. The movies are allocated based on the priority score which is calculated on a scale of five. The priority score of a movie depends on many factors such as: cast weightage, production weightage and success rate of the movie. The success rate of the movie depends on the number of tickets booked for that movie in that week. The net success rate of the movie in that week is the sum of the success rates on the weekdays and weekends. Thus the priority score of the movie is calculated using the above inputs. Weekdays have a total of 3 slots and weekends have 5 slots. Depending on the priority score of the movie they are assigned to certain slots on the weekdays and weekends accordingly. Higher the priority score of the movie, the better slot it gets. If movies of a certain priority score is absent then those slots are filled with movies of higher priority scores first and then the other movies.

PROBLEM STATEMENT:

Movie scheduling in a multiplex mall is an elaborate process which has demanded a lot of manual work until recent times. Thus the objective of the project is to devise a weekly schedule for different movies. Movies are allocated depending on the priority scores. Movies with a greater priority score must be assigned to prime time slots. This must be done to maximize the profit incurred. The priority score depends on factors like success rate and cast weightage. Thus the aim of this project is to satisfy the constraints and develop a program that helps in scheduling movies according to their respective priority scores in the corresponding time slots to maximize profits.
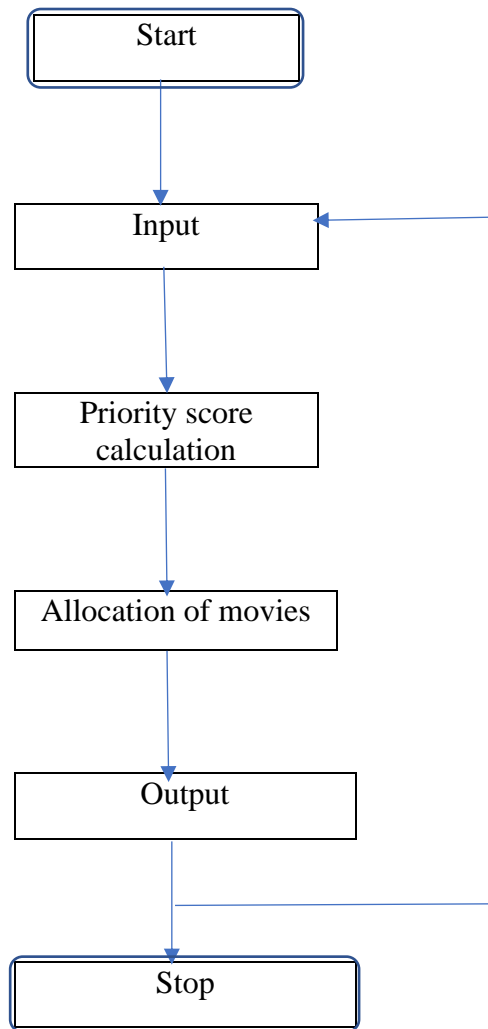
LITERATURE SURVEY:

Demand driven scheduling of movies in a multiplex – University of Pennsylvania

The paper describes a model that generates movie schedules on a weekly basis in a multiplex movie theatre. This movie algorithm creates a schedule on a daily basis for each day of the week. It aims at deciding which movie will be played according to the demand of that film and at what time the movie will be played in the theatre. This model includes:

- The total number of visitors per show for any possible starting time and the availability of the movie on that day.
- an optimization algorithm that quickly finds a very optimal schedule which helps in maximising profit.

The movie scheduling problem has been converted to a set partitioning problem for ease of implementation. This problem generation has been solved using the column generation technique. This model makes movie scheduling easier and it consumes less time and it also generates schedules that would attract many visitors due to its customer compatibility.

ARCHITECTURAL DESIGN:

```
                    ┌──────────────┐
                    │    Start     │
                    └──────────────┘
                           │
                           ▼
                    ┌──────────────┐ ◄──────────┐
                    │    Input     │            │
                    └──────────────┘            │
                           │                    │
                           ▼                    │
                ┌──────────────────┐            │
                │  Priority score  │            │
                │   calculation    │            │
                └──────────────────┘            │
                           │                    │
                           ▼                    │
                ┌──────────────────┐            │
                │Allocation of movies│          │
                └──────────────────┘            │
                           │                    │
                           ▼                    │
                ┌──────────────────┐            │
                │     Output       │────────────┘
                └──────────────────┘
                           │
                           ▼
                    ┌──────────────┐
                    │     Stop     │
                    └──────────────┘
```

METHODOLOGY:

Module 1: Movies input and priority calculation (run () module)

- **Submodule 1: Input module**

Functionality: The details of the movies are collected as input from the use such as name of the movie, whether the movie is old or new, cast and production weightage (each is calculated out of 5). Success rate is collected for the old movies separately for weekdays and weekends. Success rate for the new movies is fixed as 100 percent.

- **Submodule 2: Priority calculation**

Functionality: The priority score of old movies and new movies are calculated on the scale of 5. The priority score depends on the cast weightage, production weightage and success rate. The success rate for new movies is fixed as 2.5 (100 percent). The success rate for new movies is dependent upon the cast and production weightage and success rate of the movies. Formula used for calculating the priority score of the new movies is:

$$\text{PRIORITY\_SCORE} =$$
$$(1.25/5) \times \text{CAST\_WEIGHTAGE} + (1.25/5) \times \text{PRODUCTION\_WEIGHTAGE}$$
$$+ \text{SUCCESS RATE}$$

For old movies success rate is calculated separately for weekdays and weekends on the scale of 5. Priority score for old movies depends entirely on the success rate of the movie. Thus the success rate of old movies is collected in the ratio of 3:2 for weekdays and weekends. Formula used for calculating the priority score of the movies:

$$\text{PRIORITY\_SCORE} = \text{SUCCESS\_RATE}$$

Module 2: Allocation of the movies according to the priority score (assign () module)

- **Submodule 1: Classification of the movies**

Functionality: Movies are classified as high priority, average priority and low priority movies. Movies with priority score in the range of 4-5 comes under high priority movies and movies with priority score in the range of 2-3, 3-4 comes under the category of average movies and the movies with priority score in the range of 1-2 comes under the category of low priority movies. Movies with priority scores less than 1 is removed from the multiplex.

- **Submodule 2: Allocation of the movies with their respective slots**

Functionality: There are 5 slots on weekends and 3 slots on weekdays. Slots 3 and 5 are considered as time allocated for playing higher priority movies in order to maximise the profit on weekends and slot 3 is the time allocated for playing higher priority movies on weekdays. Slots 2 and 4 are considered as time allocated for playing average priority movies on weekends and slot 2 is the time allocated for playing average movie on weekdays. Slot 1 is the time allocated for playing low priority movies on both weekends and weekdays.

Module 3: Displaying the movies in their respective slots (output () module)

Functionality: Once assignment of the movies has been done according to the priority score, the corresponding movies are displayed. Slots 4 and 5 are inactive on weekdays and thus NA is displayed.

- If higher priority movies are not available, then prime time slots are filled with average movies. If average movies are also not available, then lower priority movies are displayed in all the slots.
- If average movies are not available to be played in time allocated for average movies, then higher priority movies are displayed in the time allocated for average movies. If higher priority movies are not available, then lower priority movies are displayed.
- If lower priority movies are not available, then their slots are filled with higher priority movies. If higher priority movies are also not available then the slots are filled with average priority movies.

The above practice has been adopted to maximise the profit incurred and also to ensure that no screen is left empty.

IMPLEMENTATION:

INPUT:

WEEK 1:

```
enter the number of upcoming new movies2
enter  1  for new movies , 0  old  for old movies :1
enter the name of the movie :vikram
enter the cast weightage within the range of [0-5] :4
enter the prodcution weightage within the range of [0-5] :4
enter  1  for new movies , 0  old  for old movies :1
enter the name of the movie :rrr
enter the cast weightage within the range of [0-5] :2
enter the prodcution weightage within the range of [0-5] :2
the name of the movie is : vikram
the cast weightage for vikram is : 4.000000
the production weightage for vikram is : 4.000000
the success rate for vikram is : 2.500000
the priority score for the vikram is : 4.500000
```

CLASSIFICATION OF THE MOVIES DEPENDING ON THE PRIORITY SCORE:

```
the name of the movie is : rrr
the cast weightage for rrr is : 2.000000
the production weightage for rrr is : 2.000000
the success rate for rrr is : 2.500000
the priority score for the rrr is : 3.500000

high priority movies are :
vikram
average priority movies are :
rrr
low priority movies are :
```

The movies during the first week are vikram and rrr. Since no low priority movies are present the high priority movie(vikram) is played in that slot.

WEEK 1-WEEKDAY (MONDAY)

Day	Screen	Slot1	Slot2	Slot3	Slot4	Slot5
Monday	1	vikram	rrr	vikram	NA	NA
	2	vikram	rrr	vikram	NA	NA
	3	vikram	rrr	vikram	NA	NA
	4	vikram	rrr	vikram	NA	NA
	5	vikram	rrr	vikram	NA	NA
	6	vikram	rrr	vikram	NA	NA
	7	vikram	rrr	vikram	NA	NA
	8	vikram	rrr	vikram	NA	NA
	9	vikram	rrr	vikram	NA	NA
	10	vikram	rrr	vikram	NA	NA
	11	vikram	rrr	vikram	NA	NA
	12	vikram	rrr	vikram	NA	NA
	13	vikram	rrr	vikram	NA	NA
	14	vikram	rrr	vikram	NA	NA
	15	vikram	rrr	vikram	NA	NA
	16	vikram	rrr	vikram	NA	NA

WEEK 1-WEEKEND (SATURDAY)

Saturday	1	vikram	rrr	vikram	rrr	vikram
	2	vikram	rrr	vikram	rrr	vikram
	3	vikram	rrr	vikram	rrr	vikram
	4	vikram	rrr	vikram	rrr	vikram
	5	vikram	rrr	vikram	rrr	vikram
	6	vikram	rrr	vikram	rrr	vikram
	7	vikram	rrr	vikram	rrr	vikram
	8	vikram	rrr	vikram	rrr	vikram
	9	vikram	rrr	vikram	rrr	vikram
	10	vikram	rrr	vikram	rrr	vikram
	11	vikram	rrr	vikram	rrr	vikram
	12	vikram	rrr	vikram	rrr	vikram
	13	vikram	rrr	vikram	rrr	vikram
	14	vikram	rrr	vikram	rrr	vikram
	15	vikram	rrr	vikram	rrr	vikram
	16	vikram	rrr	vikram	rrr	vikram

WEEK 2:

INPUT:

```
press y to continue to next weeky
enter the number of upcoming new movies2
enter  1  for new movies , 0  old  for old movies :1
enter the name of the movie :cars
enter the cast weightage within the range of [0-5] :2
enter the prodcution weightage within the range of [0-5] :2
enter  1  for new movies , 0  old  for old movies :1
enter the name of the movie :robot
enter the cast weightage within the range of [0-5] :4
enter the prodcution weightage within the range of [0-5] :4
enter  1  for new movies , 0  old  for old movies :0
enter the name of the movie :vikram
enter the success rate out of 3 for weekends :1
enter the success rate out of 2 on weekdays :0.5
enter  1  for new movies , 0  old  for old movies :0
enter the name of the movie :rrr
enter the success rate out of 3 for weekends :0
enter the success rate out of 2 on weekdays :0.5
```

CLASSIFICATION OF THE MOVIES DEPENDING ON THE PRIORITY SCORE:

```
the name of the movie is : vikram
the cast weightage for vikram is : 4.000000
the production weightage for vikram is : 4.000000
the success rate for vikram is : 1.500000
the priority score for the vikram is : 1.500000

the name of the movie is : rrr
the cast weightage for rrr is : 2.000000
the production weightage for rrr is : 2.000000
the success rate for rrr is : 0.500000
the priority score for the rrr is : 0.500000

the name of the movie is : cars
the cast weightage for cars is : 2.000000
the production weightage for cars is : 2.000000
the success rate for cars is : 2.500000
the priority score for the cars is : 3.500000

the name of the movie is : robot
the cast weightage for robot is : 4.000000
the production weightage for robot is : 4.000000
the success rate for robot is : 2.500000
the priority score for the robot is : 4.500000

high priority movies are :
robot
average priority movies are :
cars
low priority movies are :
vikram
```

The movie rrr has been removed from the rooster of movies in a multiplex since it has the priority score of less than 1 and the other movies are allocated in the respective time slots according to the changes in the priority score.

OUTPUT:

WEEK2-WEEKDAY (MONDAY)

Day	Screen	Slot1	Slot2	Slot3	Slot4	Slot5
Monday	1	vikram	cars	robot	NA	NA
	2	vikram	cars	robot	NA	NA
	3	vikram	cars	robot	NA	NA
	4	vikram	cars	robot	NA	NA
	5	vikram	cars	robot	NA	NA
	6	vikram	cars	robot	NA	NA
	7	vikram	cars	robot	NA	NA
	8	vikram	cars	robot	NA	NA
	9	vikram	cars	robot	NA	NA
	10	vikram	cars	robot	NA	NA
	11	vikram	cars	robot	NA	NA
	12	vikram	cars	robot	NA	NA
	13	vikram	cars	robot	NA	NA
	14	vikram	cars	robot	NA	NA
	15	vikram	cars	robot	NA	NA
	16	vikram	cars	robot	NA	NA

WEEK2-WEEKEND (SATURDAY)

Saturday	1	vikram	cars	robot	cars	robot
	2	vikram	cars	robot	cars	robot
	3	vikram	cars	robot	cars	robot
	4	vikram	cars	robot	cars	robot
	5	vikram	cars	robot	cars	robot
	6	vikram	cars	robot	cars	robot
	7	vikram	cars	robot	cars	robot
	8	vikram	cars	robot	cars	robot
	9	vikram	cars	robot	cars	robot
	10	vikram	cars	robot	cars	robot
	11	vikram	cars	robot	cars	robot
	12	vikram	cars	robot	cars	robot
	13	vikram	cars	robot	cars	robot
	14	vikram	cars	robot	cars	robot
	15	vikram	cars	robot	cars	robot
	16	vikram	cars	robot	cars	robot

CONCLUSION:

Thus the weekly output has been displayed. Movies have been allocated to their respective time slots according to their priority scores. The model has been built in such a way that maximum profit has been incurred while allocating the movies. Movies are classified as high priority movies, average priority movies, low priority movies according to their priority scores. According to the change in priority score of the movies they are allocated to the corresponding time slots. If the priority score of the movies drops below a certain level, they get removed from the rooster.

REFEERENCES:

- Demand driven scheduling of movies in a multiplex – research gate
- Demand driven scheduling of movies in multiplex movie theatre – ScienceDirect
- Let Us C textbook – Schaum's OutlineFile
- Let Us C textbook – Yashwant Kanetkar