QMM-Final Group Project-3

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Project Group - 03

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No Specific Assumptions have been made to be considered,each group should have an equal choice of contribution i.e. no specific groups

Factors that define the success of the students

The three factors we have considered to predict the performance of the students are:

1. Course GPA - GPA of the student for a course
2. Proficiency - Defining how proficient a student in the course.
3. Coursework - How well the student knows about the course.

Data Collection

Course administrators should have no problem collecting student GPA's.Other factors can be collected by survey/questionnaire or by showing hands during class.

Each group has three students out of 12 students.

```
set.seed(64018)
Data_Of_the_Student <- data.frame(Course_GPA = rnorm(12, mean=0.80, sd=0.1),
                        Proficiency = sample(0:1, size=12, replace=TRUE),
                        Coursework = sample.int(5, size=12, replace=TRUE))
```

```
# Ensuring max GPA of 1 and rounding to two places
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
Data_Of_the_Student <- Data_Of_the_Student %>% mutate(Course_GPA=if_else(Course_GPA > 1, 1, round(Cours
```

```
head(Data_Of_the_Student)
```

```
##   Course_GPA Proficiency Coursework
## 1       0.81           0          1
## 2       0.87           0          2
## 3       0.81           1          4
## 4       0.82           0          4
## 5       0.73           1          5
## 6       0.71           0          5
```

Decision Variables

Decision variables are members of groups.A value of $H_[i, j]$ indicates whether a student belongs to the group in which the student is jth.

Objective Function

It is the objective of this project to maximize the chances of success for each individual group.

Since all the groups will have equal chances of success, we only need to calculate the success rate of one group: $MAX Z=q_1 $ letting q_i represent the success rate of the ith group.

Based on the factors above, we can define the chances of success.For all j students in group i,

let $q_i = /Sigma_j/y_j + f_j + 0.2l_j$,

where, y_j is the student's GPA,

f_j is whether they have similar prior proficiency, and

l_j is their CourseWork.

As needed, the coefficients can be adjusted.

Constraints considered for this project

The constraints we have considered for this model are the following:

- The chances of success should be equal for all groups.
- Each group has exactly three members.
- A member must be in exactly one group at a time.

```
library(lpSolveAPI)
```

```
## Warning: package 'lpSolveAPI' was built under R version 4.1.3
```

```
Student_Model <- read.lp("StudentGroupProject.lp")
solve(Student_Model)
```

```
## [1] 0
```

```
get.objective(Student_Model)
```

```
## [1] 5.84
```

```
get.variables(Student_Model)
```

```
##  [1] 1 0 0 0 0 0 0 1 0 1 0 0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 1 0 0 0
## [39] 0 0 0 1 0 0 1 0 0 1
```

Decisions from the Group-1,2,3,4

Below are the decisions for where each student should end up:

Group 1: Students - 1,8,10

Group 2: Students - 2,3,5

Group 3: Students - 4,7,11

Group 4: Students - 6,9,12