In this assignment, you are asked to develop a restructuring strategy for SFB. The assignment is based on the case description *Integration Planning at SFB*(Parts A, B, and C), found in the Tutorial 4 materials, together with the relevant data and the file *Starting\_model.xlsx*. You are required to complete the following tasks:

1. Using Python, complete the prediction task outlined in Part B of the case. In particular, develop a model that allows you to predict the probability of employees at the Lyon facility accepting an RCC if it is offered to them. Make sure that your code prints out the predicted probability for each employee (e.g., as a list). What are the most important factors in determining whether an employee will accept an RCC?

Based on the logistic model’s results, with an RCC offered, the most important factors affecting the chance of an employee leaving the company are observed below.

Significant negative factors:

|  |  |  |
| --- | --- | --- |
| Variables | *Coefficient* | *p-values* |
| YearsInCurrentRole | -0.785603 | 3.474443e-02 |
| EnvironmentSatisfaction | -0.517245 | 1.076597e-03 |
| JobSatisfaction | -0.337484 | 2.806172e-02 |
| JobInvolvement | -0.300468 | 2.944488e-02 |

The employees who had a higher total number of years in their current roles, higher environment satisfaction, higher job satisfaction and higher job involvement would have lower probabilities of leaving the company which means higher probabilities of accepting the RCC. These are the indicators that should be concentrated on to assess the possibility of staying of each employee.

Significant positive factors:

|  |  |  |
| --- | --- | --- |
| Variables | Coefficient | p-values |
| NumCompaniesWorked | 0.587660 | 6.226938e-04 |
| BusinessTravel\_Travel\_Frequently | 0.712686 | 9.946865e-03 |
| MaritalStatus\_Single | 0.744941 | 1.504396e-03 |
| OverTime\_Yes | 0.917913 | 4.265849e-10 |

The employees who had a higher total number of companies that the employee had worked in their careers would tend to have a higher probability of leaving. This can be explained by the nature of the employees that tend to frequently switch jobs or change careers, or those employees might have a long time of work experience, so these numbers were higher, and it was easier for them to change jobs, etc.

Compared with employees who did not have to travel, people who had a frequency of employee business travel had a higher probability of leaving.

Compared with employees who divorced, single people had a higher probability of leaving.

Compared with people who did not have to work overtime, employees who worked overtime had a higher probability of leaving. This is the factor that had the biggest impact on attrition. For future implications, there should be appropriate actions to manage workload, manpower and time to avoid overtime working issues.

1. Formulate the problem outlined in Part C of the case as an optimization problem. Be sure to clarify what are the key elements of the problem as learned in class.

* Formulate the problem outlined in Part C (write down the formula)
* Key elements (Decision variables, Constraints, Objective)

Decision variables: how many and which employee categories to open the RCC to

Represent this using integer variable: 𝑥

Constraints:

The average amount gained from salary cuts must be greater than the expected savings

The average number of employees that leave must be greater or equal to management expectations

y >= 40

A certain minimum number of people in each department must be kept.

Objective: Minimize how much the severance packages are going to cost.

1. Open *Starting\_model.xlsx*. Each employee is given with a probability of accepting an RCC (please use this probability, not the one you predicted). Determine employee categories which may or may not be opened up to RCCs. In the *xlsx* file, employees have been assigned at random to placeholder categories - make sure to overwrite the group assignments based on your choices and modify the optimization problem accordingly. Moreover, make sure to justify your choice of employee categories, especially in light of possible discrimination issues.

* Determine employee categories which may or may not be opened up to RCCs.
* overwrite the group assignments based on your choices and modify the optimization problem accordingly.
* justify your choice of employee categories

1. In your Solver model, define the severance cost for each employee (the current values are randomly generated), based on the case description.

* define the severance cost for each employee

1. Solve the optimization problem using Excel Solver. Be sure to note which groups are opened up to RCC, as well as the cost you achieve.

* Which groups are opened up to RCC?
* Cost?

1. The optimization problem is incomplete. Add the following two constraints: (i) The average yearly amount gained from salary cuts must be greater than the savings expected by management and found in part A; (ii) In each of the three departments, at least 80% of the employees have to stay on. With the additional constraints, solve the problem again. How do the decision variables and the objective change?

* Decision variables – new?
* New objective?

1. Ensure that, given the optimal solution, whether an employee is offered an RCC is not implicitly linked to sensitive variables such as gender. Make sure you describe your verification process.

* Verification process description

1. Discuss possible pros and cons of the optimization approach. What are the assumptions you are making implicitly, and how likely are they to be fulfilled?

* Pros and cons of the optimization approach
* What assumptions made
* How likely are they to be fulfilled?

By December 16 (4pm), you are supposed to submit the following package:

* A notebook, containing all the code required to reproduce your Python analysis.
* An xlsx-file, containing the optimization problem and solution you set up (based on *Starting\_model.xlsx*).
* Your textual answers, including justifications. You can either submit these in a separate pdf-file, or as part of your notebook. In either case, make clear which question you are answering