

# Assignment-3

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**Create a ranking system that enables universities to measure the quality of the education they deliver to their students. The metrics should include,**

- How faculty and courses contribute to the growth of their graduates over 5 year period.
- Track jobs, promotions of the graduates over time.
- Connection of courses and their relevance to graduates' growth.

**Solution:**

**To quantify how faculty and courses contribute to graduate growth over five years**

- We first consider the feedback from Alumni regarding the courses they took during their enrolment in University.
- We also consider feedback for the Alumni regarding the professors that taught the courses they enrolled in.
- We consider the Alumni employment or education history in the past 5 years.
  - The Alumni employment history tracks
    - The number of promotions obtained in the past five years.
    - Starting and current salary.
    - Number of Patents
    - Relevant courses for employment as deemed by the Alumni.
  - The Alumni education history tracks
    - Number of Publications
    - Relevant courses for higher education as deemed by the Alumni.

We quantify these measurements and combine them to obtain a metric to measure the quality of education the University delivers to its students from the alumni perspective.

$$\bullet \text{ AvgAlumCourseScore} = \left( \sum_{i=1}^{numAlumni} (courseRating) \right) / numAlumni$$

courseRating taken from the Alumni feedback.

$$\bullet \text{ AvgAlumFacultyScore} = \left( \sum_{i=0}^{numAlumni} (facultyRating) \right) / numAlumni$$

facultyRating taken from the Alumni feedback.

For ranking alumni to obtain an estimate of alumni performance after graduation, we consider **AlumniJobScore** and also **AlumniHigherEdScore**

$$\begin{aligned}
 \text{AlumniJobScore} = & \left( \frac{\text{current salary} - \text{prev. salary}}{\text{prev.salary} * 10} \right. \\
 & + \text{numOfPromotions} \\
 & \left. + \text{numOfPatents} \right) \\
 \text{AlumniHigherEdScore} = & \left( \text{numOfPublications} \right. \\
 & \left. + \text{numOfCitations} \right)
 \end{aligned}$$

Next, we convert both scores to a number between **1 to 10** enabling us to track these scores across Departments, Universities. Finally, we obtain the AlumniScore,

$$\text{AlumniScore} = \left( \sum_{i=0}^{\text{numAlumni}} (\text{AlumniJobScore} + \text{AlumniHigherEdScore}) \right) / \text{numAlumni}$$

### Courses, Faculty, and Relevance to graduate growth:

- When we consider the feedback from the Alumni, we are additionally requesting the courses information from them which they feel are most relevant to their job growth in the past 5 years. (relevantCourses)
- Next, we calculate the **AlumniScore** of all the alumni for the given department (e.g, Information Systems) and consider the **top 10%** of the alumni based on the AlumniScore.
- We navigate to find these Alumni's relevantCourses using alumnild and also get faculty for these courses along with their ratings.
- Now from this pool, we pick the 10 most frequent courses, which are essentially the most relevant and top-rated courses

To obtain the department wise score to compare among Departments in a university, we combine the course, professor, alumni score we use the following formula

$$\text{DepartmentScore} = \text{AvgAlumCourseScore} + \text{AvgAlumFacultyScore} + \text{AlumniScore}$$

- With this combined rating, universities can track the rating of each department present in the universities and improve on the feedback received from Alumni by,
  - By updating the course catalog of each department to reflect the courses which the Alumni feel are most relevant.
  - Considering the Alumni feedback for the courses and professors, and working on improving the course content and faculty.

### **Ranking system for students to decide which University they choose:**

In order to help prospective students choose the university, we have formulated the following metrics,

- We take the average of DepartmentScore among all the departments in the university which comprehensively assesses the courses, faculty, and alumni's prospects at the university level.

$$\text{AvgDepartmentScore} = \left( \sum_{i=0}^{\text{numDepartments}} (\text{DepartmentScore}) \right) / \text{numDepartments}$$

- We consider the graduation rate for each department in the university and get the average across all departments to obtain AvgGraduationRate for each university.
- We also consider the Average of alumni salaries and also the average placement ratio.
- We additionally add a "Research-Oriented" filter to enable students to choose top research universities.

$$\text{UniversityRating} = \text{AvgDepartmentScore} + \text{AvgGraduationRate} + \text{AverageAlumniSalaries}$$