

# **MSBA and MBA Program Choices by TurboRank Inc.**

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## **1 Brand Name of the Project**

TurboRank Inc.

## **2 Mission Statement**

- 1) To help prospective students, who intend to take MSBA/MBA in the U.S., to choose the most suitable program(s) based on their needs (e.g: rankings, tuition, test scores, etc.)
- 2) To help deans of MSBA/MBA in the U.S. universities to know about the overall situation of the program, especially the rankings of the program and related factors influences the rankings
- 3) To help the researchers who conduct related research to get the information of MSBA/MBA programs in U.S. universities quickly.

## **3 Mission Objectives**

- 1) To know the rankings of Robert H. Smith MSBA program on different ranking lists
- 2) To find MSBA programs which provide data mining course
- 3) To find the MSBA program with mean GMAT score less than or equal to 700 and mean undergraduate GPA less than or equal to 3.5
- 4) To present the information of the MBA program with highest ROI

## **4 Business Transactions**

- 1) What are the different institutions that rank the Robert H. Smith MSBA program through the years?
- 2) Which MSBA programs has an alumni outcome with 100% of alumni being responsive and involved?
- 3) What are the different rankings for MSBA programs with the top 4 employment rate?
- 4) Which university has a higher score of diversity?
- 5) What are the MSBA programs with mean GMAT score less than or equal to 700 and mean undergraduate GPA less than or equal to 3.5?
- 6) What are the details of the top five MBA programs in each ranking source in 2021?

- 7) What are the scores of selective students of the MSBA program and the corresponding program ranking in QS?
- 8) What is the number of core courses that each program provides and how many credits of these courses in total?
- 9) Which MSBA programs provide the data mining course?
- 10) What are the top ten programs with the highest international student rate?
- 11) What are the program and its university 2021 QS ranking of all programs that are more than 18 months?
- 12) Which program's average undergraduate GPA is not more than 3.5 in 2021, and its TOEFL, GRE requirement?
- 13) What is the program information of the highest ROI MBA program?
- 14) What are the average tuition, starting salary and ROI score of QS World University Ranking for MBA in descending order?
- 15) What is the mean starting salary and tuition for MSBA in ascending order?
- 16) What is the Diversity/Employability/AlumniOutcome scores of top 4 ranking MBA programs from QS in 2021?
- 17) What is the average undergraduate GPA of the top 10 programs with the highest GMAT score in 2021?
- 18) Which universities provide a MSBA program with duration of no more than one-year and tuition of no more than \$55000

## 5 ER Schema and ER Diagram

### 5.1 ER Schema

#### Entities, Attributes and Primary Keys

RankInstitution(**rlid**, insName, insCountry)

University(**uld**, uniName, uniLoc[1..5])

Program(**pld**, prgDuration, prgName)

ProgramInformation (**prgRankyear**, prgAcceptance, prgSelectivieScore, -prgMeanGMAT, -prgMeanGRE, -prgMeanTOEFL, -prgMeanUndergraduateGPA, prgDiversity, -prgIntStudentRate, -prgFemaleStudentRate, prgEmploymentRate, prgMeanStartSalary, prgTuition, prgFacultyStudentRate)

Course (**cld**, crsName, crsCredit)

#### Relationships, Attributes, Degrees, Participating Entities and Constraints

Associate(**uniRankYear**, uniRank): binary relationship

1 RankInstitution to 0 or more University

1 University to 1 or more RankInstitution

Provide: binary relationship

1 University to 1 or more Program

1 Program to 1 University

Have: binary relationship

1 Program to 1 or more Course

1 Course to 1 or more Program

Belong to: binary relationship

1 Program to 1 or more ProgramInformation

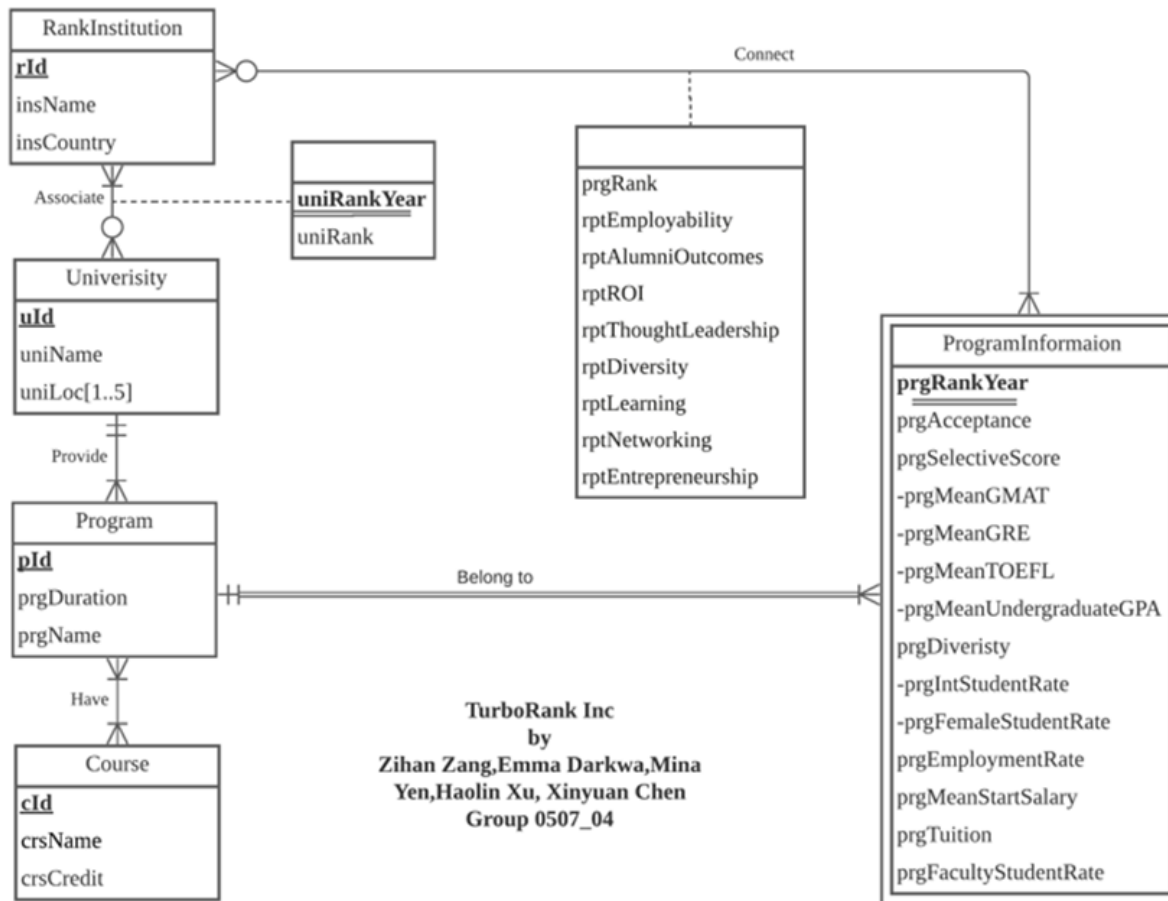
1 ProgramInformation to 1 Program

Connect (prgRank, rptEmployability, rptAlumniOutcomes, rptROI, rptThoughtLeadership, rptDiversity, rptLearning, rptNetworking, rptEntrepreneurship): binary relationship

1 RankInstitution to 1 or more ProgramInformation

1 ProgramInformation to 0 or more RankInstitution

## 5.2 ER Diagram



## 6 Relations

RankInstitution (rId, insName, insCountry)

University (uId, uniName)

UniversityLoc (uniLoc, uId)

Program (pId, uId, prgDuration, prgName)

Course (cId, crsName, crsCredit)

ProgramInformation (prgRankYear, pId, prgAcceptance, prgMeanGMAT, prgMeanGRE, prgMeanTOEFL, prgMeanUndergradGPA, prgIntStudentRate, prgFemaleStudentRate, prgEmploymentRate, prgMeanStartSalary, prgTuition, prgFacultyStudentRate)

Associate (uniRankYear, uId, rId, uniRank)

Have (pId, cId)

Connect (rId, pId, prgRankYear, prgRank, rptEmployability, rptAlumniOutcomes, rptROI,

rptThoughtLeadership, rptDiversity, rptLearning, rptNetworking, rptEntrepreneurship)

## 7 Functional Dependencies

rld → insName, insCountry

uld → uniName

uniLoc, uld →

pId → uld, prgDuration, prgName

cId → crsName, crsCredit

prgRankYear, pId → prgAcceptance, prgMeanGMAT, prgMeanGRE, prgMeanTOEFL,  
prgMeanUndergradGPA, prgIntStudentRate, prgFemaleStudentRate, prgEmploymentRate,  
prgMeanStartSalary, prgTuition, prgFacultyStudentRate

uniRankYear, uld, rld → uniRank

pId, cId →

rld, pId, prgRankYear → prgRank, rptEmployability, rptAlumniOutcomes, rptROI,  
rptThoughtLeadership, rptDiversity, rptLearning, rptNetworking, rptEntrepreneurship

## 8 Business Rules and Referential Integrity Actions

### 8.1 Business Rules

[R1] When a university is deleted from or changed in the database, all programs which belong to this university should be deleted or changed accordingly.

[R2] When a program is deleted or updated, the corresponding course of the program needs to be deleted or updated accordingly.

[R3] When a course is deleted or updated, the corresponding information of the course needs to be deleted or updated in the course list that shows which program provide the course.

[R4] When there exists a university ranking, this university cannot be deleted in the database.

[R5] When the information of a university is updated, the corresponding university ranking information needs to be updated accordingly.

[R6] When there exists a university ranking, the institution which decided the ranking cannot be deleted in the database.

[R7] When the information of an institution is updated, the corresponding university ranking information needs to be updated accordingly.

[R8] When a university has merged with another university and is deleted, the corresponding university location information should be deleted accordingly.

[R9] When the information of university is updated, the corresponding university locations information should be updated accordingly.

[R10] When there exists a program ranking, the institution which decided the ranking cannot be deleted in the database.

[R11] When the information of an institution is updated, the corresponding program ranking information needs to be updated accordingly.

[R12] When there exists a program ranking, the corresponding program information cannot be deleted in the database.

[R13] When program information is updated, the corresponding program ranking information needs to be updated accordingly.

[R14] When a program is deleted or updated in the data, the program information should also be deleted or changed accordingly.

## 8.2 Referential Integrity Actions

Relation	Foreign Key	Base Relation	Primary Key	Business Rule	Constraint: ON DELETE	Business Rule	Constraint: ON UPDATE
Connect	rld	Rank Institution	rld	R10	NO ACTION	R11	CASCADE
Connect	(prgRankYear, pld)	ProgramInformation	(prgRankYear, pld)	R12	NO ACTION	R13	CASCADE
University Loc	uld	University	uld	R8	CASCADE	R9	CASCADE
Program	uld	University	uld	R1	CASCADE	R1	CASCADE
Associate	uld	University	uld	R4	NO ACTION	R5	CASCADE
Associate	rld	Rank Institution	rld	R6	NO ACTION	R7	CASCADE
Have	pld	Program	pld	R2	CASCADE	R2	CASCADE
Have	cld	Course	cld	R3	CASCADE	R3	CASCADE
ProgramInformation	pld	Program	pld	R14	CASCADE	R14	CASCADE

## 9 Sample Data for Every Relation

RankInstitution (**rid**, insName, insCountry)

('r01', 'QS World University Rankings', 'the Great Britain'),  
('r02', 'The Financial Engineering Times', 'the United States'),  
('r03', 'Bloomberg', 'the United States')

University (**uld**, uniName)

('u01', 'University of Maryland'),  
('u02', 'Carnegie Mellon University'),  
('u03', 'Cornell University')

UniversityLoc (**uniLoc**, **uld**)

('College Park', 'u01'),  
('Pittsburgh', 'u02'),  
('Ithaca', 'u03')

Program (**pId**, **uld**, prgDuration, prgName)

('p01', 'u01', 16, 'Master of Science in Business Analytics'),  
('p03', 'u02', 24, 'Master of Business Administration'),  
('p04', 'u03', 24, 'Master of Business Administration'),  
('p05', 'u04', 24, 'Master of Business Administration')

ProgramInformation (**prgRankYear**, **pId**, prgAcceptance, prgMeanGMAT, prgMeanGRE,  
prgMeanTOEFL, prgMeanUndergradGPA, prgIntStudentRate, prgFemaleStudentRate,  
prgEmploymentRate, prgMeanStartSalary, prgTuition, prgFacultyStudentRate)

('2021', 'p01', NULL, 639, 309, NULL, 3.4, NULL, 0.46, 0.7, 75000.00, 60450.00, NULL),  
('2021', 'p02', 0.458, 660, NULL, NULL, 3.3, 0.30, 0.46, NULL, 101000.00, 113292.00,  
NULL),  
('2021', 'p03', 0.277, 691, NULL, NULL, 3.35, 0.34, 0.21, 0.957, 134847.00, 140000.00,  
NULL)

Course (**cId**, crsName, crsCredit)

('c001', 'Database Management Systems', 3),  
('c002', 'Decision Analytics', 3),

('c003', 'Data, Models, and Decisions', 3),  
('c004', 'Data Processing and Analysis in Python', 3)

Have (**pId**, **cId**)

('p01', 'c001'),  
('p01', 'c002'),  
('p01', 'c003'),  
('p01', 'c004')

Associate (**uniRankYear**, **uId**, **rId**, uniRank)

('2021', 'u01', 'r01', '152'),  
('2020', 'u01', 'r01', '136'),  
('2020', 'u02', 'r01', '48'),

Connect (**rId**, **pId**, **prgRankYear**, prgRank, rptEmployability, rptAlumniOutcomes,  
rptROI, rptThoughtLeadership, rptDiversity, rptLearning, rptNetworking, rptEntrepreneurship)

('r01', 'p01', '2021', '25', NULL, 92, 65, 69.5, 64.5, NULL, NULL, NULL),  
('r01', 'p02', '2021', '51', 43, 42.6, 65.1, 59.3, 54.3, NULL, NULL, NULL),  
('r01', 'p03', '2021', '18', 62.8, 65.3, 91, 68.8, 60.5, NULL, NULL, NULL)