Data Management Over Multiple Decision

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Master in Information Technologies

2017

მრავალგადაწყვეტილებიანი მონაცემების მართვა

თორნიკე გოგუაძე

სამაგისტრო პროგრამა: ინფორმაციული ტექნოლოგიები

ნაშრომი შესრულებულია ინფორმაციული ტექნოლოგიების მაგისტრის აკადემიური ხარისხის მოსაპოვებლად

ხელმძღვანელი: მირეი დუკასი,
მანანა ხაჩიძე, მაგდა ცინცაძე
ასოცირებული პროფესორი

თბილისი

2017

Master in Information Technologies

Data Management Over Multiple Decision

Master Project Thesis

Degree in Information Technologies

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12.07.2017

Acknowledgments

I would like to express my respect and tell thank to all those who provided me the possibility to participate in ERASMUS + Exchange Program between INSA and Tbilisi State University. A special gratitude I would like to give to my Master thesis supervisors: Mireille Ducasse and Peggy Cellier from Institute national des sciences appliqués de Rennes
and Manana Khachidze, Irma Tsintsadze from Tbilisi State University, whose contribution in stimulating suggestions and encouragement, thanks to their comments and advices. Thanks to Professor Philippe Le Vot who helped us for Better understanding in English.

Abstract

We have designed a process for course allocation [2] that has proved effective for a decision where students make all their choices at one time. However, our current need is to enable students to make choices at different moments (actually they are 3 different moments, one in each of their three years of study at the Computer Science department).

From a scientific point of view, the current process uses "regret points" which are not satisfactory. The scientific challenge is to design a better way to handle regret points (or any other mechanism) that enables students who have not had their first choice at one time to get a better chance for their next choices. The project will start by the definition of a better process.

From a practical point of view, the approach requires that information about previous votes, allocations and regret points are kept in a database. Moreover, the vote information has to be managed and verified. A preliminary prototype exists in Java with a database in SQLite. The project will extend this prototype in order to improve the management of the "regret points".

Scientific challenge: find a way to manage "regret points".

Practical aim: develop a data management and verification process to guaranty fairness over time.

რეზიუმე

თეზისი ეხება განხორციელებულ პროცესს რომელიც ამტკიცებს ეფექტურ განაწილებას გადაწყვეტილების მისაღებად , სადაც სტუდენტს შეუძლია ყველა არჩევანი გააკეთოს . თუმცა, ჩვენი მიზანია სტუდენტებს საშუალება მიეცეთ არჩევანის გაკეთების სხვადასხვა მომენტში (რეალურად ეს მომენტი არის სამი სხვადასხვა სახის, რადგან თითოეული სტუდენტი სამი წლის განმავლობაშ სწავლობს კომპიუტერულ მეცნიერებათა განყოფილებაში).

სამეცნიერო თვალსაზრისით , მიმდინარე პროცესი იყენებს პრინციპს „regret points“ , რომელიც არ არის დამაკმაყოფილებელი. სამეცნიერო გამოწვევა და თეზისიც შეიქმნა იმისთვის, რათა შეიცვალოს პრინციპი ქულათა გადანაწილების შესახებ (ან ნებისმიერი სხვა მექანიზმი), რომელიც საშუალებას აძლევს სტუდენტებს, რომელთაც ვერ მოახერხეს სასურველი არცევანის მიღება პირველ ჯერზე , რათა მიიღონ უკეთესი შანსი მომდევნო არჩევნაის გაკეთების დროს. თეზისი შეიქმნა უკეთესი პროცესის განსაზღვრისთვის.

პრაქტიკული თვალსაზრისით, მიდგომა მოითხოვს, რომ მონაცემთა ბაზაში განთავსდეს ინფორმაცია, სტუდენტების მიერ გაკეთებული არჩევანის შესახებ , მათ მიერ მინიჭებული ქულების და სხვა საჭირო ინფორმაციის შესახებ. უფორ მეტიც აუცილებლად ინფორმაცია უნდა შემოწმდეს და დახარისხდეს.

წინასწარი პროტოტიპი შექმნილია პროგრამირების ენა Java- ში , მონაცემთა ბაზად კი გამოყენებულია SQLite. პროექტის მიზანია გააუმჯობესოს და დაიხვეწოს ქულათა გადანაწილები სპრინციპი და მისი გამოყენების საშუალებები.

თეზისის სამეცნიერო გამოწვევა : ქულათა გადანაწილების „regret points“ უკეთესი პრინციპი.

პრაქტიკული მიზანი : შევიმუშაოთ სისტემა რომელიც მაქსიმალურად სამართლიანი იქნება სტუდენტისთვის.

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1. Introduction

1.1 Introduction Context

The National Institute of Applied Sciences of Rennes or INSA is a Grande Ecole of Engineers, a School of Engineering, under the authority of the French Ministry of Education and Research and part of the INSA's group.

Created in 1966, INSA Rennes is a member of the **INSA Group,** the **leading French network of state graduate and post graduate engineering schools**, composed of 6 schools in France, 7 partner schools and 1 international INSA in Morocco.

Research and innovation are the key elements of **INSA training**, which benefits from the expertise of its **130 professors and lecturers**. With **six laboratories of international renown**, three technological platforms and numerous industrial partners, INSA Rennes stands out for **two poles of excellence: Information &Communication Science &Technologies / Materials, Structures & Mechanics.**

IRISA - (Institute for Research in Computer Science and Random Systems), founded in 1975, is a joint research center for Informatics, including Robotics and Image and Signal Processing. On these themes, Irisa is positioned as the premier research laboratory in Brittany with campuses in Rennes (35), Vannes (56), Lannion (22), and Brest (29).

750 people, 40 teams, 7 departments (Large Scale Systems/Networks, telecommunications and services/Language and Software Engineering/Digital signals and imaging, robotics/Media and communications/Data and knowledge management) explore the world of digital sciences to find applications in healthcare, ecology-environment, cyber-security, transportation, multimedia, and Industry.

TSU- The first-ever national university in the Caucasus was opened in 1918 laying the foundation for a European-type higher school in Georgia, based on Georgian educational traditions. Today the Ivane

Javakhishvili Tbilisi State University is one of the first scientific-research institutions of Georgia. It implements about 200 local and international scientific grant programs annually.

The Tbilisi State University is one of the largest higher educational institutions by its scales. Today about 22 thousand students are undergoing studies at seven faculties of TSU.

Along with bachelors, masters and doctoral degree programs, the Tbilisi State University also implements higher vocational education, as well as short and long term certification programs. Based on close cooperation with foreign universities, Georgian students have opportunities to participate in exchange and joint international educational programs and gain double academic degrees.

The computer sciences department in France, are characterized by being the confluence of major areas of knowledge. As for context of internship I am at INSA with Erasmus Plus program, where I'm working on my master thesis, which I mentioned is connected in group decision making by logical navigation and data management over multiple decision.
Project consist two side of working, first is practical work on database tools SQLite and main platform on Java, second part is theory and scientific view of this project which is huge research, I want to represent and share information about Bids, Arguments and Sensitive multi-unit assignment and also group decision multidimensional nature of real life decision making problem.

1.2 Bids, Arguments and Preferences in Sensitive multi-unit Assignment

At the most universities one of the major task is course allocation, distribution in enterprises or course allocation at universities are examples of sensitive multi-unit assignment problems, where a set of resources is to be allocated among a set of agents having multi-unit demands. Automatic processes exist, based on quantitative information, for example bids or preference ranking, or even on

lotteries. In sensitive cases, however, decisions are taken by persons also using qualitative information. At present, no multi-unit assignment system supports both quantitative and qualitative information. In this paper where, in addition to bids and preferences, agents can give arguments to motivate their choice. Bids are used to automatically make pre-assignments, qualitative arguments and preferences help decision makers break ties in a founded way. A group decision support system, based on Logical Information Systems, allows decision makers to handle bids, arguments and preferences in a unified interface.

A successful course allocation case study is reported. It spans over two university years. The decision makers were confident about the process and the resulting assignment. Furthermore, the students, even the ones who did not get all their wishes, found the process to be equitable.

Course allocation at universities is a multi-unit assignment problem, a set of individual resources is to be allocated amongst a set of agents, the agents have multi-unit demands and no monetary transfer are possible. Agents are students and the resources are seats in courses. [1]

Bonus allocation system where, a boss wants to distribute a given number of fixed bonuses to the most deserving employees, according to project leader's recommendations. In that case, the resources are the bonuses and the agents are the project leaders who recommend possibly several of their project members for a bonus, the boss(es) are the actual decision maker(s). It has been shown by [2].

Several solutions are proposed to go beyond pure dictatorship. In the first category, preferences are used: each agent provides a totally ordered list of resources from the most preferred to the least preferred. [3] propose a course allocation system in several rounds, the students are randomly ordered but they choose one course at a time; at each round the order of the list is reversed, the first served student at a given round is the last served at the next round. The several-round approach is used, for example, in the New York City high school match [4]. Gale and Shapley proposed a dual approach also in several rounds in the context of university match.

In the second category, bids are used: agents have a number of points, called bid endowment, that they can distribute to the resources they want. The straightforward way to use bids is as follows: the agents that bid the most for each resource are assigned to that resource until it is exhausted. In the context of course allocation, Sönmez and Ünver show, however, that bids have in general two

different roles, to infer student preferences and to determine who has the bigger claims on course seats [5]

Students may bid higher for popular courses than for courses that they truly prefer, students may bid so high on less preferred but popular courses that they may get them at early stages and their bundle may be full before the more preferred courses are considered. The algorithm eliminates the above explained bias because students' bundle cannot be full before their most preferred courses are considered. In the context of bonus allocation, applying bids/preferences algorithms means that project leaders distribute grades over the members of their project, they can also rank them to apply the later algorithm. Distributing the grades is a very sensitive task, even without bonus considerations. Most of the approaches based on bids and preferences aim at large scale problems and they are fully automatic. A lottery is in general used to break ties. In order to reduce the probability of ties, the bid endowment can be large, for example 100 bidding points per semester at university of Michigan of Business School [5].

[6] report that agents with a good perception of the interdependence between agents in a given situation react much better to unfavorable results if they believe that the processes are equitable. They also dis- cuss that perceived procedural justice is important for a wide range of behaviors. It is consistent with the first fairness principle of [7], namely developing transparency so that agents understand the process in which decisions are made.

of [8], the proposed process is another illustration that LIS tools significantly contribute to information access tools that provide group members with ways to store, share, find, and classify data objects.

The MUAP-LIS process has been tested in two steps. The first step is described in [1] At a computer science department of a university,

33 students had to choose between two courses for 4 different teaching modules. After an initial unsatisfactory process, the students requested that motivation was taken into account. A preliminary version of the MUAP-LIS process was proposed. Students tested the proposed process for a simulation. The students and the teacher in charge of the course allocation voted for the proposed process to be deployed. For the second step, the following year, the MUAP-LIS process was revised according to the students and decision maker's feedbacks. An actual assignment has been achieved using the designed

process. The decision maker reported feeling much more serene. Furthermore, the students, even the ones who did not get all their wishes, judged that the MUAP-LIS process was equitable.

According to the past and practical experience with our supervisors we start thinking and understanding what was next step.
Student have couple of options and he/she need to manage his bidding points to declare choice. During this process there maybe become some exactions like extra cases where some of agents have same bidding points distributed on same choices so using arguments they can explain them, why they want that course with one sentence.
however, that bids have in general two different roles, to infer student. So this whole system is look like see Figure 1.

To make this system easy to make decisions to manage students on their seats during searching more unfair way we start to work creating more flexible way.to change database and make new filters and check points during process.

Main difficulties are to declare how many bidding points is requiring, but it's still question how much and how long it should be, one semester or during the year.

1.3 Introduction of Group Decision Making by Logical Navigation

Problem what was faced to us was real life decision making problem. In everyday life, to reduce information are used "Take the best", which is based on Logical Information System, it guarantees some fairness.
An important issue is the use of multiple criteria. As emphasized in [9], it is crucial to take into account the multidimensional nature of real-world decision-making problems. Indeed, [10] have

shown that groups working on a multiple criteria task formulation will converge better than groups working on a single criterion formulation.

In multicriteria decision analysis (MCDA) as well as in multicriteria classification and sorting, criteria are in general aggregated to reduce information overload. A sim- ple form of aggregation function is a weighted sum: criteria are given a numerical value and a weight, then a weighted sum is computed. More sophisticated aggregation functions can be found in [11]. A MCDA model requires to a priori elicit preferences of decision makers, for example to compute weights for a weighted sum. In [12], it is emphasized that producing numerical criteria weights is arbitrary and can lead to dubious results. In order to pal- liate those problems, they propose the MACBETH system, where decision makers are asked to fully rank the criteria, then according to the actual values of the data the system automatically produces weights to insure consistency in the actual context. In Mesta [13], for each criterion, participants are asked to propose acceptable thresholds using a graphical facility. Another approach, called case-based preference elicitation, asks decision makers to specify their global preference judgments on existing representative cases; preference parameters that reproduce the decision makers' judgments as accurately as possible are then produced [14]. In the context of fuzzy preference relations, [15] note that it is difficult for experts to express the required preferences in a consistent and complete way due to the amount of information they have to provide for large sets of alternatives. In [16] a rich logic is provided to decision makers so that they express their preferences in terms close to natural language. The logics includes fuzzy quantifiers (e.g. most, several, some, approximately k.). The authors also mention that unanimous agreements between persons are rare in real situations and they therefore calculate the degree of consensus.

1.3.1. Input and Data

Benefits. Regarding input and data, as opposed to MCDA, the main advantage of our process is that the values of the properties on which are built the criteria do not need to be numerical. They can also be symbolic; their analysis is logical. There is no need to artificially map symbolic or textual information to numbers.

Another advantage is that the displayed data are always relevant to the rule currently under construction. Indeed, only properties fulfilled by the alternatives matching the query are displayed.

Limitations and Perspectives. The table associating property values to alternatives has to be prepared. This may take some time. Note, however, that there are a number of cases where the properties and criteria are known, for example in the domain of law [18] as mentioned in Sect. 1. In our case studies the data are statutory. It is mandatory that grades and ECTS credits information are collected so that the committee can validly deliberate. Thus whatever process is used, the data have to be prepared.

1.3.2. Output

Benefits. Regarding the output, the main advantage of our approach is to produce rules that take multiple criteria into account within a logical formula. They help participants agree upon and commit to the decision. This is especially true because textual and symbolic values are handled by the logics. The rules therefore record legible arguments on which the group agrees, and which can be relied upon. Note that the study by [19] provides evidence that for facilitators *the consensus building collaboration pattern appears to be the most demanding.*

The produced rules can be seen as decision makers' preferences for the current decision within the current context. Hence Logical Multicriteria Sort provides some support for case-based preference elicitation. The advantage is that for further deci- sions the rules can be updated on the fly.

Another advantage of the tool is that once the group has agreed on a set of criteria, the alternatives which fulfill the criteria are automatically selected and thus sorted. If the group changes its mind on given criteria, it is guaranteed that the alternatives that are no longer valid are discarded and that the ones that should no longer be discarded are back in the discussion. Note that the latter point is

especially difficult to achieve without a relevant supporting tool. Note also that the tool can accommodate hundreds of thousands of alternatives and criteria. That is largely above the usual numbers used in decision making.

Limitations and Perspectives. At present, only the criteria on which there is total consensus are recorded as rules. The main objective of Logical Multicriteria Sort is to help identify islands of agreement on a (possibly large) set of small decisions. It could, nevertheless, be interesting to be able to record partial agreement on proposed criteria. A perspective is to include mechanisms, for example to record voting on proposed rules when no consensus is possible.

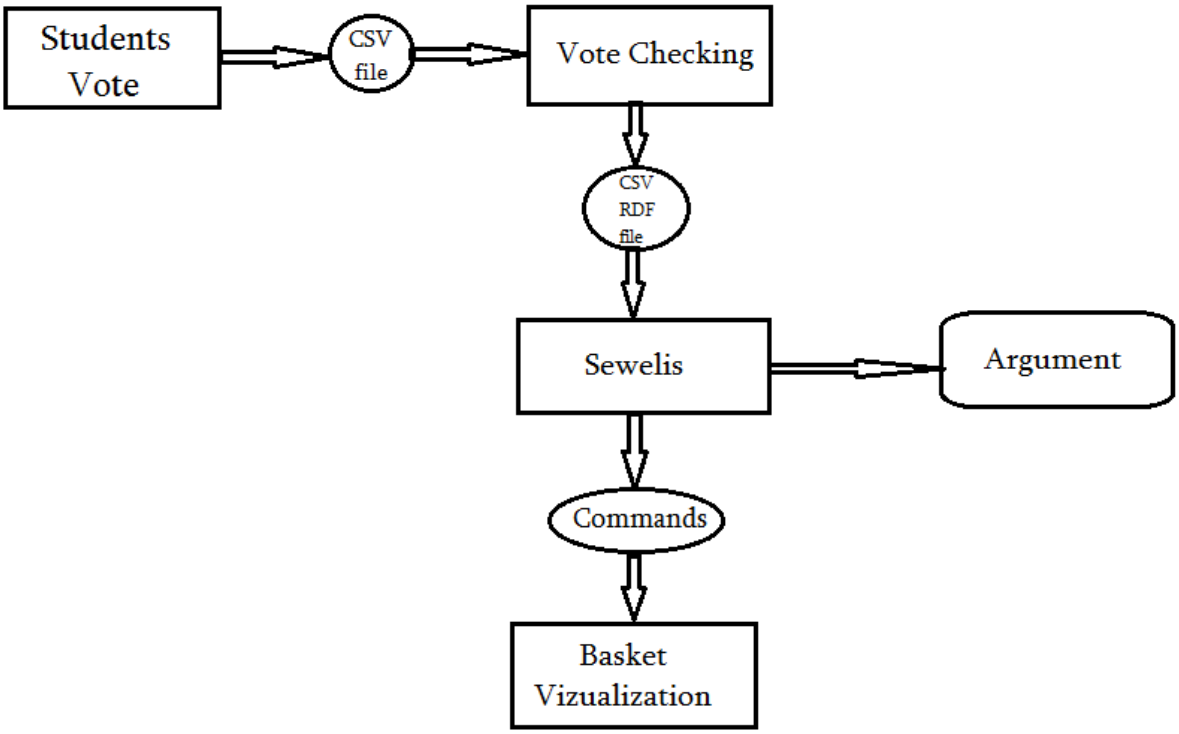


Figure 1 Table of Registration System

Till I will start practical work I want to explain how system is working starting from student voting to Sewelis.

Student voting for their options to reach best choice for them, then this information is transferred and saved in CVS file, after that there is starting new level, called vote check where is filters and information will be collected again in CVS file after filtering and modification and last step is to take that information in Sewelis and to manage each students sits on clases.

2. modification Entity Association Diagram

On the practical view of project, work started form database side tools was SQLite and Java,

You can see on Figure 1 created Entity association diagram, which describes relationships and connections between where each student can register on different semesters and also on different year, student can vote on different option and choose different choices, after registration there should be minimum and maximal biding point on each semester, if student can't choose desired choice, then after consultation and discussion it will be clear which choice will be chosen. It's a small review of how entity associational diagram works properly for INSA computer science department.

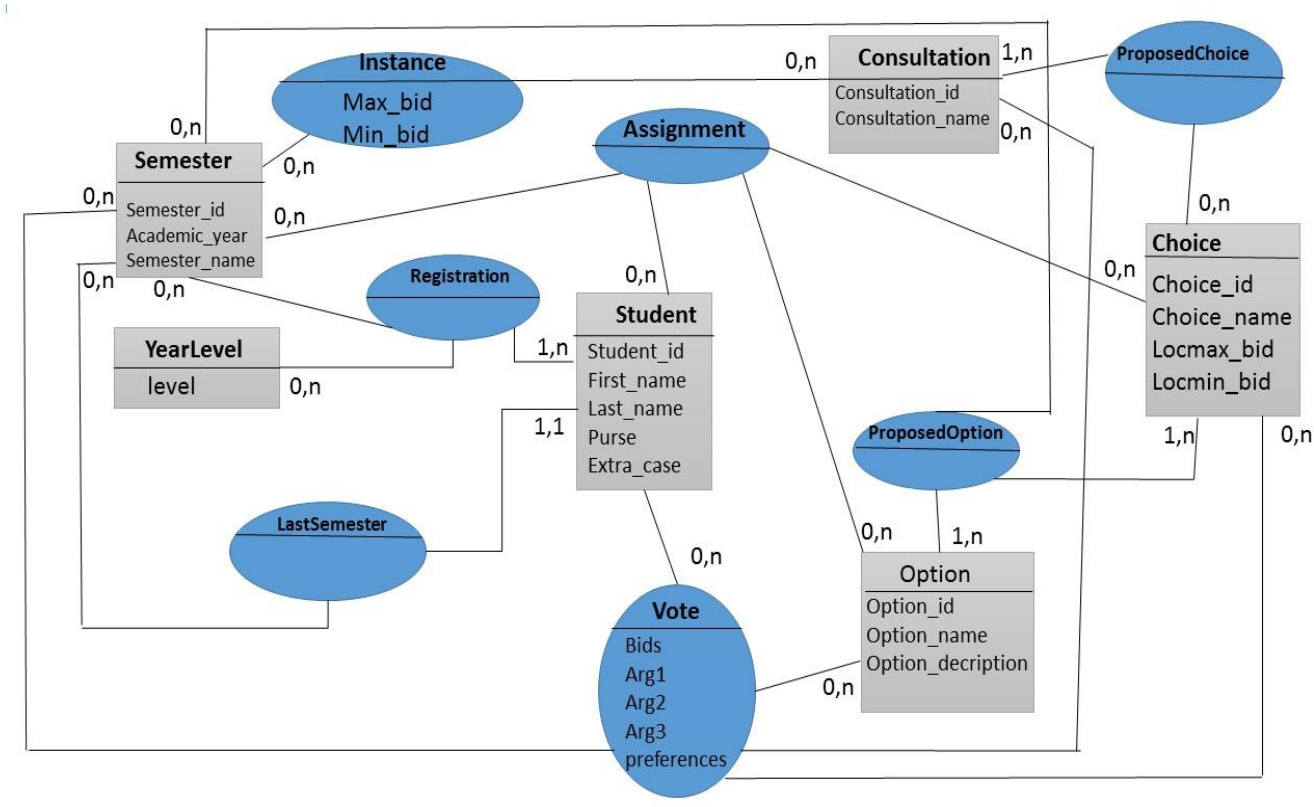


Figure 2 Entity Association Diagram

2.1. explanation of each Entity and Attributes:

- **Student**: Is person registered in computer sciences department.
    - Student_id: identification number for each student.
    - first_name: Student first name.
    - last name: Student family, middle name.
    - Purse: number of bidding tokens which student has.
    - Extra_case: when student has some specific learning agreement features.

- **Semester:** Each academic year includes two semesters, spring and autumn.
    - semester_id: Identification number for semester (conjunction of academic year and semester name).
    - Academic_year: academic year to which current semester belongs.
    - Semester_name: identify which semester it's one of (S5, S6, S7, S8, S9).

- **YearLevel**:
    - Level: On which year level is student one of (3A, 4A, 5A).

- **Consultation**: moment when students express their preferences about course assignment(s).
    - Consultation_id: identification number for consultation.
    - consultation_name: String ("3A first consultation").

- **Choice**: within a consultation groups of possible courses.
    - Choice_id: Identification number of choice.
    - choice_name: String ("Thread").
    - locmax_bid: local maximum bid for the choice.
    - locmin_bid: local minimum bid for the choice.

- **Option**: within a choice the possible courses.
    - Option_id: Identification number of each option.
    - option_name: String ("Big Data").

- option_description: String, small description of the option.

- **Vote:** Student which is in different semester can Vote different options and choices and express their preferences about course assignment.
  - Bids: Bidding tokens which student gave to their preferred option.
  - Arguments: student should write 3 arguments why he/she want that option (Arg1, Arg2, Arg3).
  - Preferences: Student have to manage their priority.

- Instance: After Consultation each semester have their max and min Bids.
  - Max_bid: Number of exact semesters bidding token which is enough to make sure you are involved in the course.
  - Min_bid: Number of bidding tokes which is minimum, is require to take course.

- Registration: Student is registering on current year and semester.
- Assignment: The option of this choice is assigned to the student for the semester.
- ProposedOption: The option of this choice is proposed for the semester.
- ProposedChoice: Choice proposed for consultation.
- Last_semester: this is semester when student will leave INSA.

2.2 Relational Diagram.

Relational diagram is looking like that, each entity and assignment connection you can see on the Figure 3. Semester have connection …

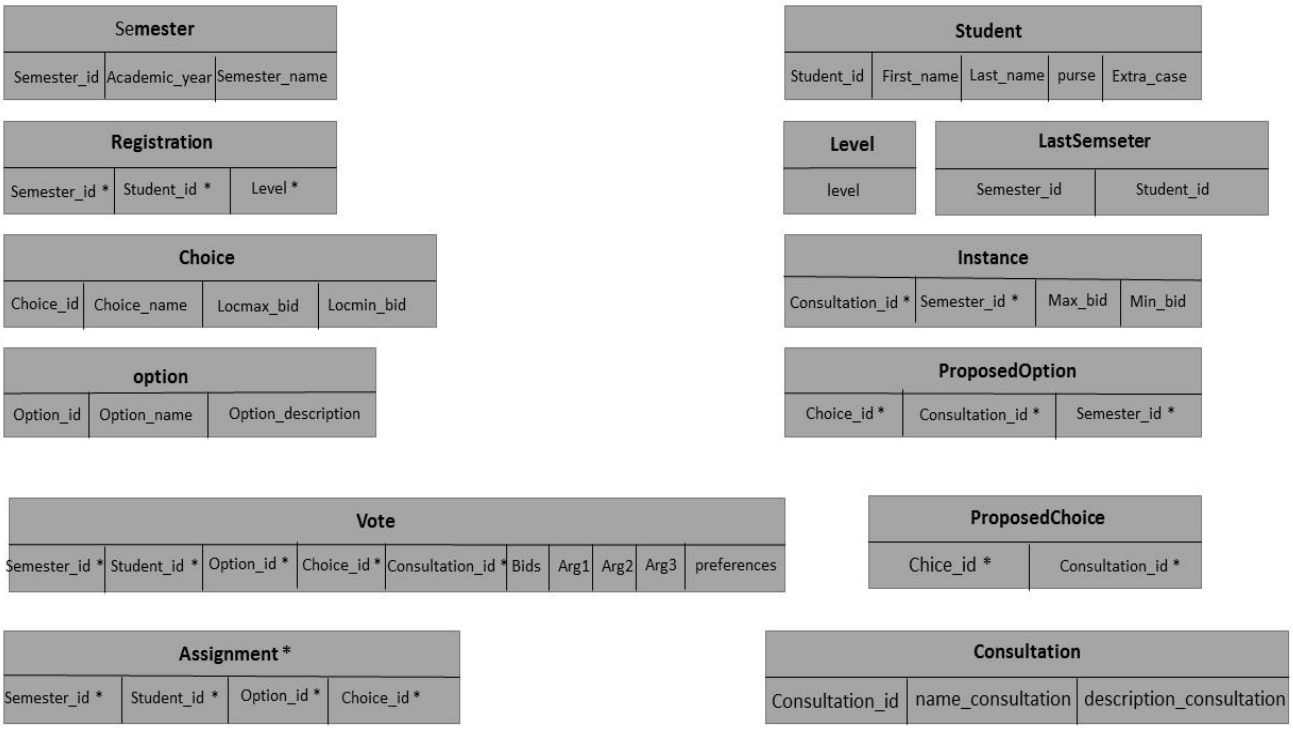


Figure 3 Relational Diagram

Database Implementation

For implementation of our work we are using SQLite Database system. During process we changed and modified new Association and Relational diagrams, create new SQLite database (initialisationDB.txt) where all tables are created and initialized with new default values.

```
21 CREATE TABLE IF NOT EXISTS Student(
22     student_id  INTEGER PRIMARY KEY,
23     first_name VARCHAR(60) NOT NULL,
24     last_name  VARCHAR(100) NOT NULL,
25     purse INTEGER NOT NULL  DEFAULT 0,
26     last_semester  INTEGER ,
27     /* to be changed : related to semester */
28     year_registration INTEGER ,
29     /* to be changed : related to year_level */
30     semester_registration INTEGER,
31     /* to be changed : related to semester */
32     extra_case  BOOLEAN);
```

Figure 4 Create Table

With the values:

```
148 DELETE FROM Student;
149 INSERT INTO Student (student_id, first_name, last_name, purse, extra_case) VALUES (1, "tornike" , "Goguadze", 8, 1);
150 INSERT INTO Student (student_id, first_name, last_name, purse, extra_case) VALUES (2, "John" , "Watson", 8, 0);
151 INSERT INTO Student (student_id, first_name, last_name, purse, extra_case) VALUES (3, "Mike" , "Mouratidis", 8, 0);
152 INSERT INTO Student (student_id, first_name, last_name, purse, extra_case) VALUES (4, "Gustavo" , "Funchal", 8, 0);
```

Figure 5 Values of Student Table

After creation of each table and giving them values, I started testing of each table with different values and during process, I changed and make new tables in java, initialisationBD.txt file also in SQLite, during taking values for example on the Figure 6 you can see table choice and it's values, first is choice_id, what option student have, bidding points, in this case student have 8 bidding point:

```
CREATE TABLE Assignment(
    choice_id INTEGER NOT NULL,
        option_id INTEGER NOT NULL,
        semester_id INTEGER NOT NULL,
        student_id INTEGER NOT NULL,
        PRIMARY KEY(choice_id, option_id, semester_id,student_id),
        FOREIGN KEY(choice_id) REFERENCES choice(choice_id),
        FOREIGN KEY(option_id) REFERENCES option(option_id),
        FOREIGN KEY(student_id) REFERENCES student(student_id),
        FOREIGN KEY(semester_id) REFERENCES semester(semester_id));
sqlite> select * from choice;
1,Option 1,8,0
2,Option 2,8,0
3,Option 3,8,0
sqlite>
```

Figure 6 Table in SQLite

database structure changes we connect input CVS file to our database to import all information from file and make all filter levels what will make more easy and flexible database for administrator who must need to control it.

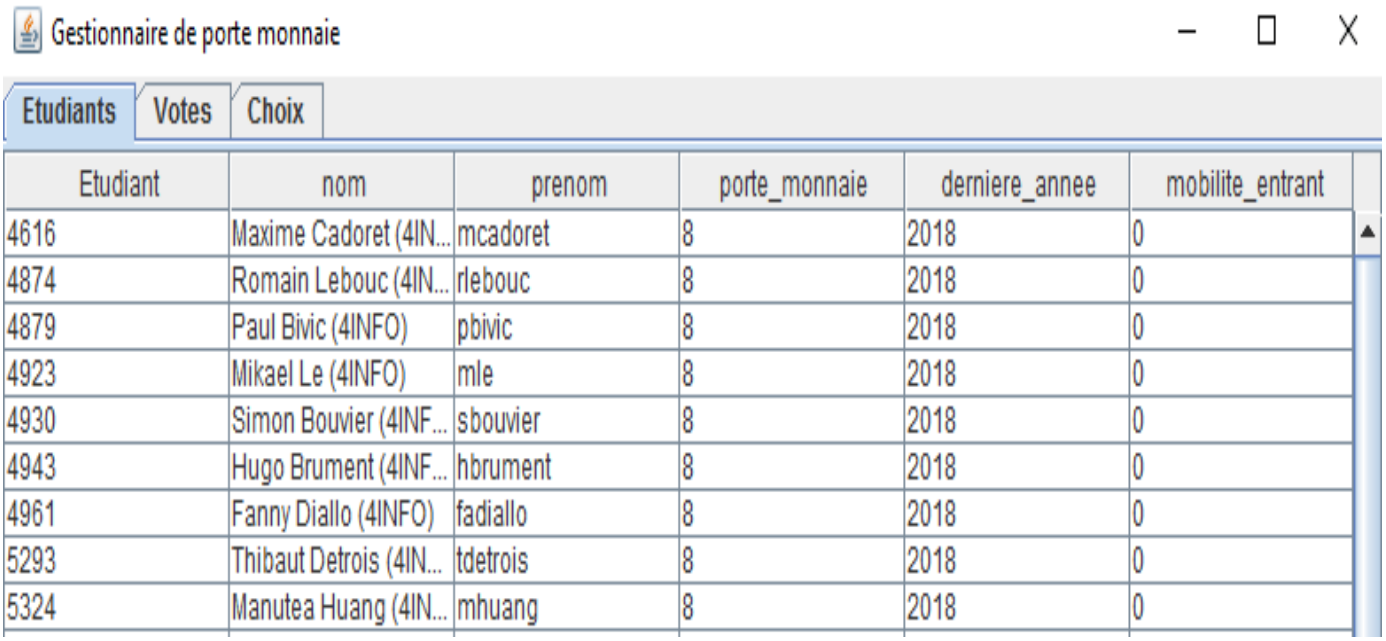
On the database consulting with supervisors we add new entities and then create each table (Student, Semester, YearLevel, Consultation, Choice, Option, Vote, ProposedOption, ProposedChoice, Assignment, Instance, Registration, Last Semester) with values and then checked all tables to make sure there is no errors.

Take a small review we made new database with Association and Relational diagrams and with their values, so we finish database modification and start to display is using with Programing language JAVA.

For the first time we displayed Student table with attributes (student_id, first_name, last_name, purse, extra_case) and we gave some default values. Then to take information from database we start to connect our software and database together to take information for this table from initialisationBD.txt file.

In Java after database modification, all information is collected and saved in csv file, and after that when all students will make registration we can have picture of whole system, see on Figure 7

Where you can see information about student, name surname, bidding points, year level. After student will fill blank before starting the next semester, it's necessary to right down all that information

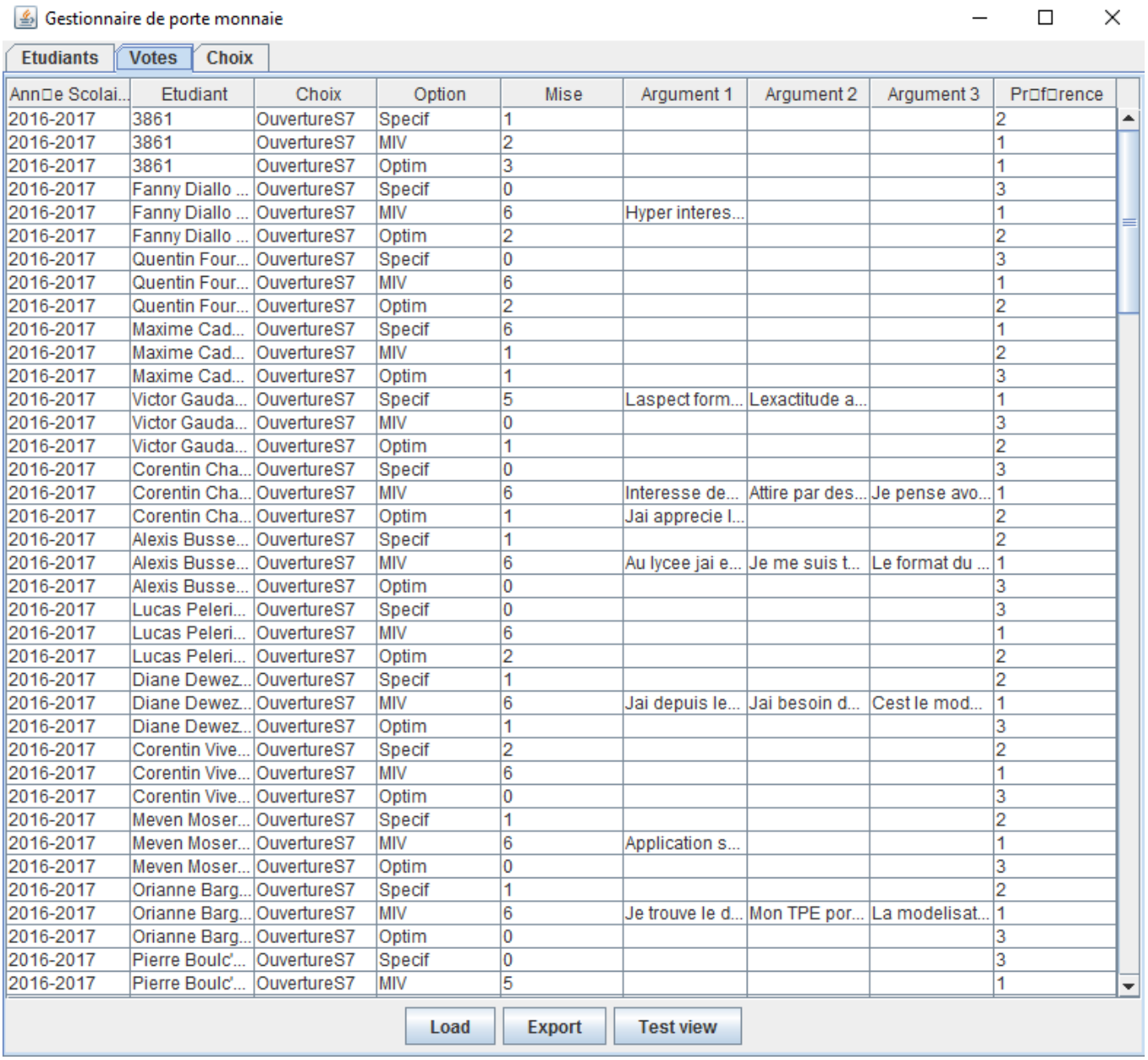


Etudiant	nom	prenom	porte_monnaie	derniere_annee	mobilite_entrant
4616	Maxime Cadoret (4IN...	mcadoret	8	2018	0
4874	Romain Lebouc (4IN...	rlebouc	8	2018	0
4879	Paul Bivic (4INFO)	pbivic	8	2018	0
4923	Mikael Le (4INFO)	mle	8	2018	0
4930	Simon Bouvier (4INF...	sbouvier	8	2018	0
4943	Hugo Brument (4INF...	hbrument	8	2018	0
4961	Fanny Diallo (4INFO)	fadiallo	8	2018	0
5293	Thibaut Detrois (4IN...	tdetrois	8	2018	0
5324	Manutea Huang (4IN...	mhuang	8	2018	0

Figure 7 Output in Java

On the other field you can see Votes, see Figure 8, after filling the questioner all information are saved and collected in CSV file.

Information which is required from university is year level, it means on which year is student going to study and choose different options, also student is going to vote for choice, he/she should manage all Bidding Points what they have, in this case max biding point is 8. On each student after choosing choices and options they should right 3 arguments that why the want this course, and at the end there is field for Preferences.



Ann□e Scolai...	Etudiant	Choix	Option	Mise	Argument 1	Argument 2	Argument 3	Pr□f□rence
2016-2017	3861	OuvertureS7	Specif	1				2
2016-2017	3861	OuvertureS7	MIV	2				1
2016-2017	3861	OuvertureS7	Optim	3				1
2016-2017	Fanny Diallo ...	OuvertureS7	Specif	0				3
2016-2017	Fanny Diallo ...	OuvertureS7	MIV	6	Hyper interes...			1
2016-2017	Fanny Diallo ...	OuvertureS7	Optim	2				2
2016-2017	Quentin Four...	OuvertureS7	Specif	0				3
2016-2017	Quentin Four...	OuvertureS7	MIV	6				1
2016-2017	Quentin Four...	OuvertureS7	Optim	2				2
2016-2017	Maxime Cad...	OuvertureS7	Specif	6				1
2016-2017	Maxime Cad...	OuvertureS7	MIV	1				2
2016-2017	Maxime Cad...	OuvertureS7	Optim	1				3
2016-2017	Victor Gauda...	OuvertureS7	Specif	5	Laspect form...	Lexactitude a...		1
2016-2017	Victor Gauda...	OuvertureS7	MIV	0				3
2016-2017	Victor Gauda...	OuvertureS7	Optim	1				2
2016-2017	Corentin Cha...	OuvertureS7	Specif	0				3
2016-2017	Corentin Cha...	OuvertureS7	MIV	6	Interesse de...	Attire par des...	Je pense avo...	1
2016-2017	Corentin Cha...	OuvertureS7	Optim	1	Jai apprecie l...			2
2016-2017	Alexis Busse...	OuvertureS7	Specif	1				2
2016-2017	Alexis Busse...	OuvertureS7	MIV	6	Au lycee jai e...	Je me suis t...	Le format du ...	1
2016-2017	Alexis Busse...	OuvertureS7	Optim	0				3
2016-2017	Lucas Peleri...	OuvertureS7	Specif	0				3
2016-2017	Lucas Peleri...	OuvertureS7	MIV	6				1
2016-2017	Lucas Peleri...	OuvertureS7	Optim	2				2
2016-2017	Diane Dewez...	OuvertureS7	Specif	1				2
2016-2017	Diane Dewez...	OuvertureS7	MIV	6	Jai depuis le...	Jai besoin d...	Cest le mod...	1
2016-2017	Diane Dewez...	OuvertureS7	Optim	1				3
2016-2017	Corentin Vive...	OuvertureS7	Specif	2				2
2016-2017	Corentin Vive...	OuvertureS7	MIV	6				1
2016-2017	Corentin Vive...	OuvertureS7	Optim	0				3
2016-2017	Meven Moser...	OuvertureS7	Specif	1				2
2016-2017	Meven Moser...	OuvertureS7	MIV	6	Application s...			1
2016-2017	Meven Moser...	OuvertureS7	Optim	0				3
2016-2017	Orianne Barg...	OuvertureS7	Specif	1				2
2016-2017	Orianne Barg...	OuvertureS7	MIV	6	Je trouve le d...	Mon TPE por...	La modelisat...	1
2016-2017	Orianne Barg...	OuvertureS7	Optim	0				3
2016-2017	Pierre Boulc'...	OuvertureS7	Specif	0				3
2016-2017	Pierre Boulc'...	OuvertureS7	MIV	5				1

Figure 8 Voting Information

After collection all information they were sent in sewelis platform but before it need to filter with different fields and during this Exchange I started working on it but because of the time limitation we just create way what should be there when you enter on button “add”. There should be window with

different fields of informations to choos choice and scrolling panel, and many information to manage choices.

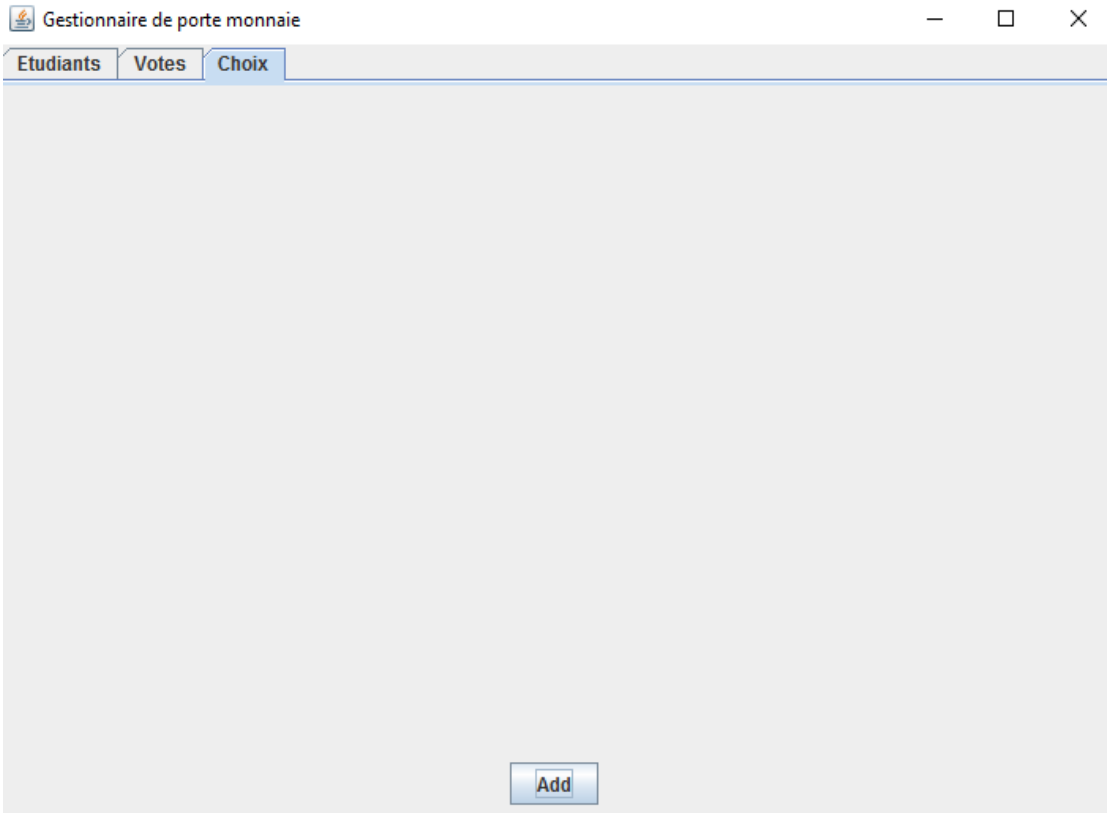


Figure 9 choice add button

3. Conclusion

In this article we have proposed the Logical Multicriteria Sort process. To address the problems of a multicriteria decision, Logical Multicriteria Sort considers criteria one at a time as the Take-the-best heuristic. There is no predefined order between criteria, participants put forward the ones they find the most relevant at a given time.

Once a criterion has been found discriminating it is recorded, the process is iterated and relevant criteria are logically combined. It avoids the need for a complete a priori preference elicitation as opposed to the MCDA tools. Logical Multicriteria Sort guarantees more fairness and speed than the current sorting processes and thinkLets. In particular, the meeting duration is independent of the number of considered alternatives.

Logical Multicriteria Sort is supported by a GDSS, based on Logical Information Systems (LIS). Thanks to the tool, the group can share a better understanding of the situation and it can be easier to collectively take responsibility for a sensitive decision. In particular, the tool keeps tracks of all of the decisions taken so far with a set of rules that explain how alternatives have been sorted. It also gives an instantaneous feedback of each current decision. It helps decision makers to quickly reach islands of agreement.

Logical Multicriteria Sort has been tested on the debriefing of an academic year validation committee whose results had been controversial. The case study participants were positive about the process and they all agreed to use Logical Multicriteria Sort and the supporting tool for the forthcoming committee at the same level. The two persons who had to take responsibility for the decision were the most positive about the results of the meeting.

In this paper, we have proposed a Pareto-efficient, Gale–Shapley-stable and p-equitable process to address multi-assignment problems. As opposed to existing approaches, quantitative information (bids, preferences and rankings) as well as qualitative information (arguments) of the agents drive the major part of the process without having to totally order the agents. It allows agents to be treated

equally. In addition, to the best of our knowledge, this process is the only one that can take into account qualitative information in a tractable way. The process is supported by a Logical Information System tool that, thanks to logical faceted navigation, allows decision makers to handle bids, arguments and preferences in a unified interface. We reported the test of the process on a course allocation problem at a university. There were two stages spanned over two university years. The first one was a simulation with real users and the second one was an actual assignment. This experiment shows that both the process and the resulting assignment have been judged equitable and well accepted by the students and the teacher in charge.

we have provided an exposition of the various mechanisms used by academic institutions to allocate services like courses, parking spots, and office space and interview slots. We described the workings of each mechanism as well as looked at the positive and negative features of each of them and illustrated them with the use of examples. While other real world application of designed mechanisms like auctions designed to allocate pollution permits or distribute bandwidth to mobile phone providers have as their principle motivation generation of revenue, in these examples from Academia, the principle motivation is to allocate the product or service efficiently.

This paper concentrates mainly on course allocation mechanisms and we note that academic institutions especially the larger ones have become more and more comfortable implementing some form of course allocation system that is different from the standard registration format used in most academic institutions. We also note that the major cost of these mechanisms is really the process of getting students acquainted with the specific auction or course allocation mechanism and to make sure that the students are properly trained to use these mechanisms efficiently. The academic institution does not collect any revenue in the course allocation mechanisms but does reap the benefits of having the courses allocated more efficiently.

Interesting future research would come in the form of analyzing actual data related to some of these auction mechanisms. Fortunately, Columbia University as well as the University of Michigan provides publicly available data on their course allocation auctions. Thus, in a follow up research paper to this one, we will try and use the publicly available data to statistically analyze some of the

issue that we have described and illustrated in this paper using examples. This will provide a deeper understanding of the benefits and costs of some of these auction mechanisms that have been described here

All this was scientific way of view of this paper and project, practically it is really interesting also to work but for me it was really good experience and really good opportunity to involve on this research, I'm fully involve and hope I will have chance to keep working on this topic.

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