



**University at Buffalo**  
*The State University of New York*

**CSE 587 Data Intensive Computing**

**Project 2 – Problem 3**

**Building an analysis and visualization user interface**

**Submitted by:**

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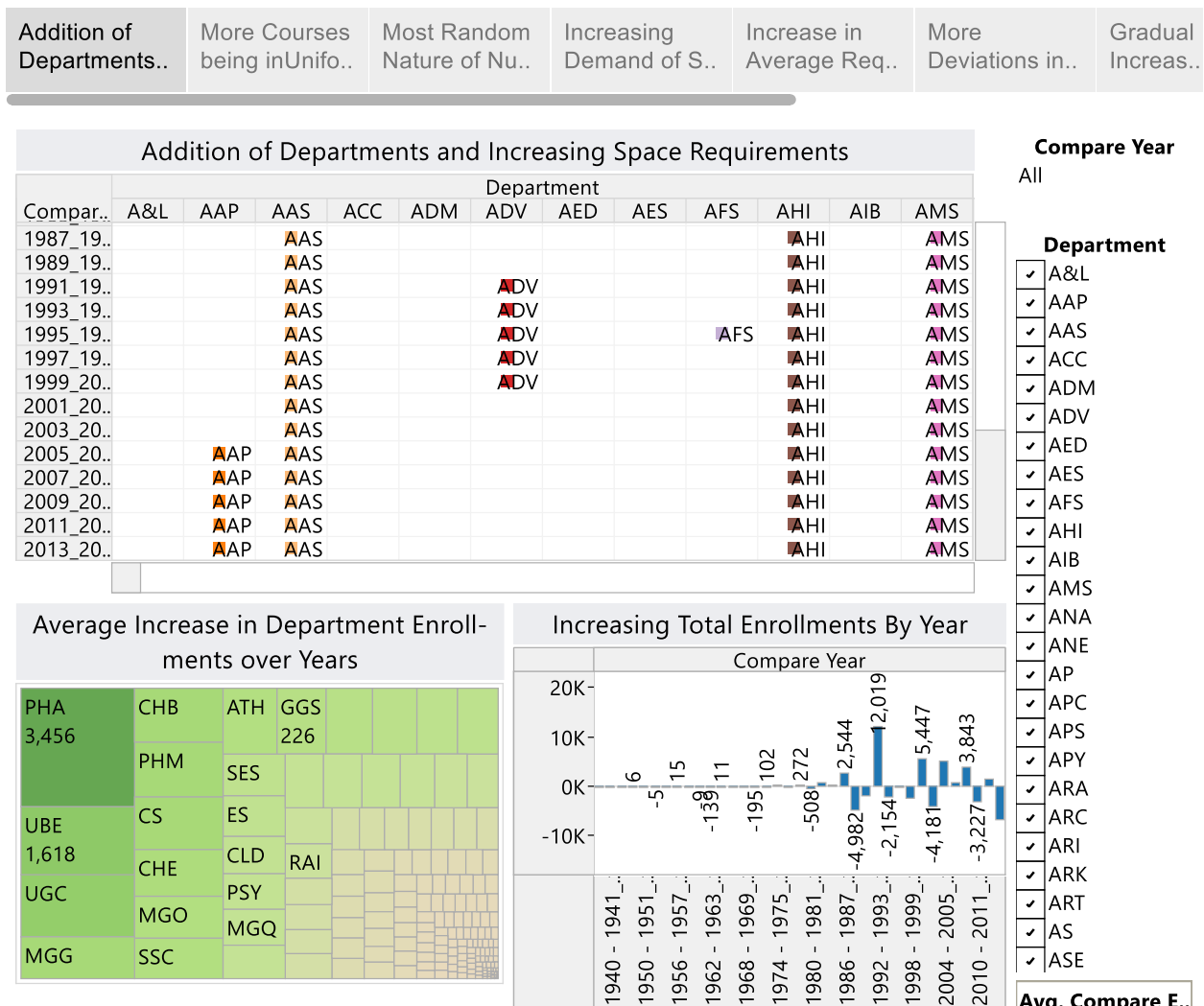
Tableau Workbook Link:

Increasing Course Demand and Availability of Resources at UB

[https://public.tableau.com/profile/publish/Story1\\_37/FinalStory#!/publish-confirm](https://public.tableau.com/profile/publish/Story1_37/FinalStory#!/publish-confirm)

## 1. Addition of Departments and Following increase in Space requirements

# Increasing Course demand & Availability of Resources..



- From the above data plot shows us that in the recent years more number of courses are being added from which we can infer that there is a possibility of more courses being added due to the advancement and research in various fields of study.
- There is a significant change in the number of students being enrolled in some years because if the student is enrolled in a University then he may enroll in multiple courses. So small change in the number of enrolling students may show a huge difference in the plot.
- The less number of change in enrollments in the earlier years seen could also be due to the fact that there was an inadequate access to the data, all data may not have been recorded or the tools to fetch and store this huge amount of data were not possible at that time.

➤ **From years 1931 till 1982:**

There has been negligible change in the number of students enrolled in the university. A trend can be seen in the number of students enrolled in the courses offered by the university which prefer to take up the same courses or the same number of courses.

➤ **From years 1982 till 1994**

- A large change in the number of students were getting enrolled in the university. Showing a change in the trend of taking up fixed or the same total number of courses being enrolled.
- There can be two scenarios which can explain this trend:
  1. A student may be getting more freedom to choose courses from other departments or may be able to choose more courses that were added in the curriculum during these years and quickly gain populism in the same department he is enrolled.
  2. The number of students being enrolled in the college in the later years may have higher count, ultimately increasing the total number of enrolled students in all courses in a year

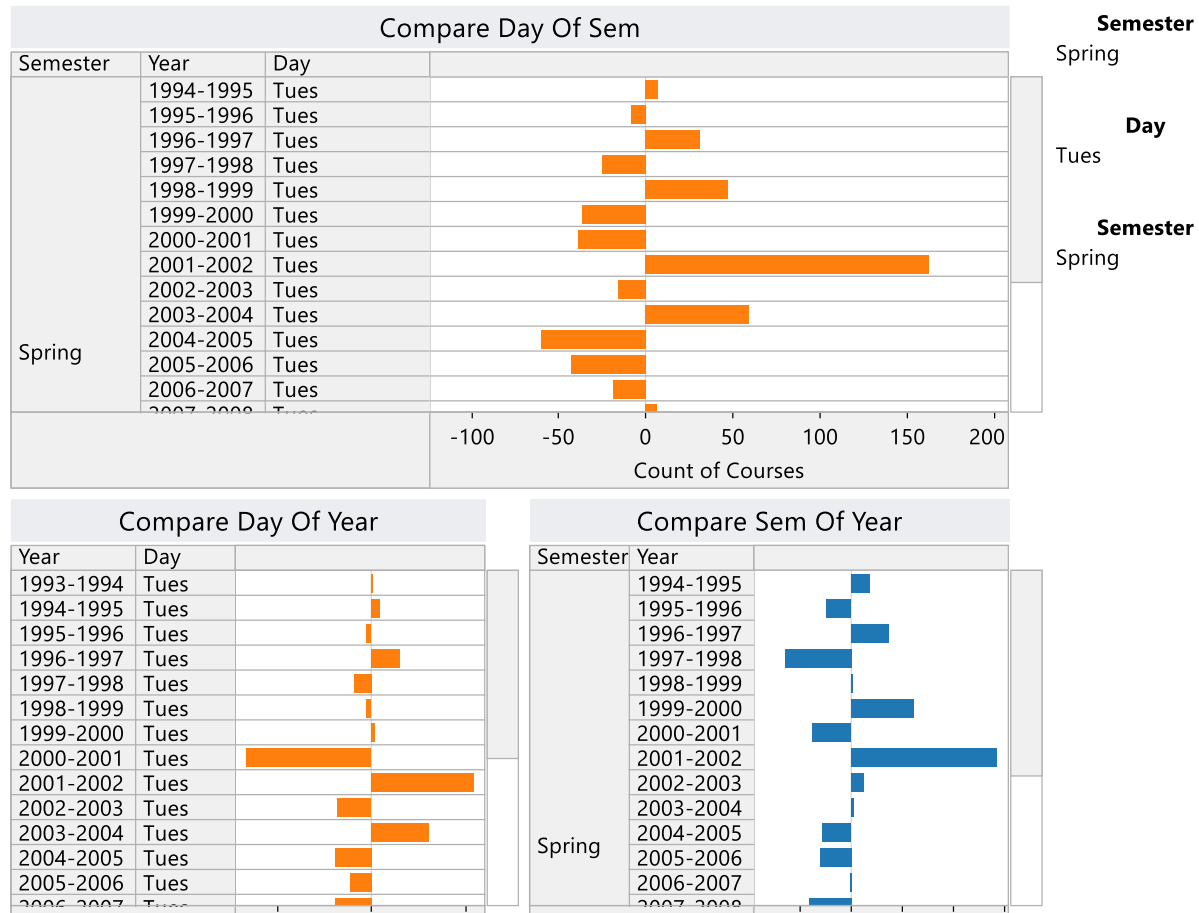
➤ **From 1993 – 1994 till 2015-2016**

A constant increase and decrease in the number of enrollments were seen showing students were more selective and getting enrolled in courses according to the feedbacks received from internet and university alumni's considering job prospects and research.

## 2. More Courses being un Uniformly Conducted in a Day Causing Under Utilized Class Rooms

### Increasing Course demand & Availability of Resources..

Addition of Departments..	More Courses being inUnifo..	Most Random Nature of Nu..	Increasing Demand of S..	Increase in Average Req..	More Deviations in..	Gradual Increas..
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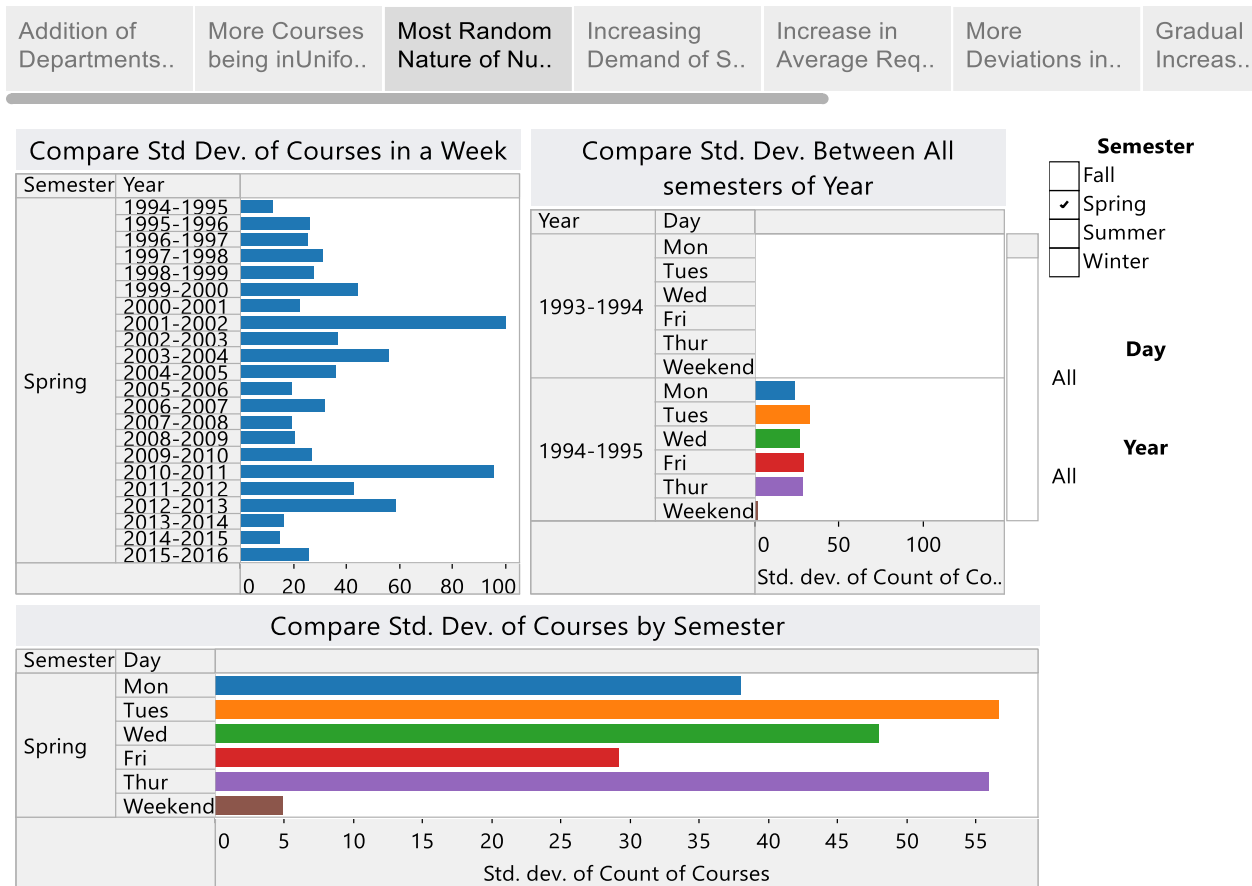


**Fig. 2 Dashboard 2: Comparison of Day, Semester and Year of Number of Courses**

- The above graph shows us that majority of the courses are being conducted in a particular time of the day which results in inefficient space and building utilization. Professors and Lecturers should be able to distribute their time in the day for better and effective use of the day around the year.

3. A large Standard Deviation after every decade with newly added courses shows adjustment in the current schedules to accommodate the new coming courses. which may result in scarcity of available resources, if this trend continues. Also some Weekdays being more popular than others in the decade year.

## Increasing Course demand & Availability of Resources..

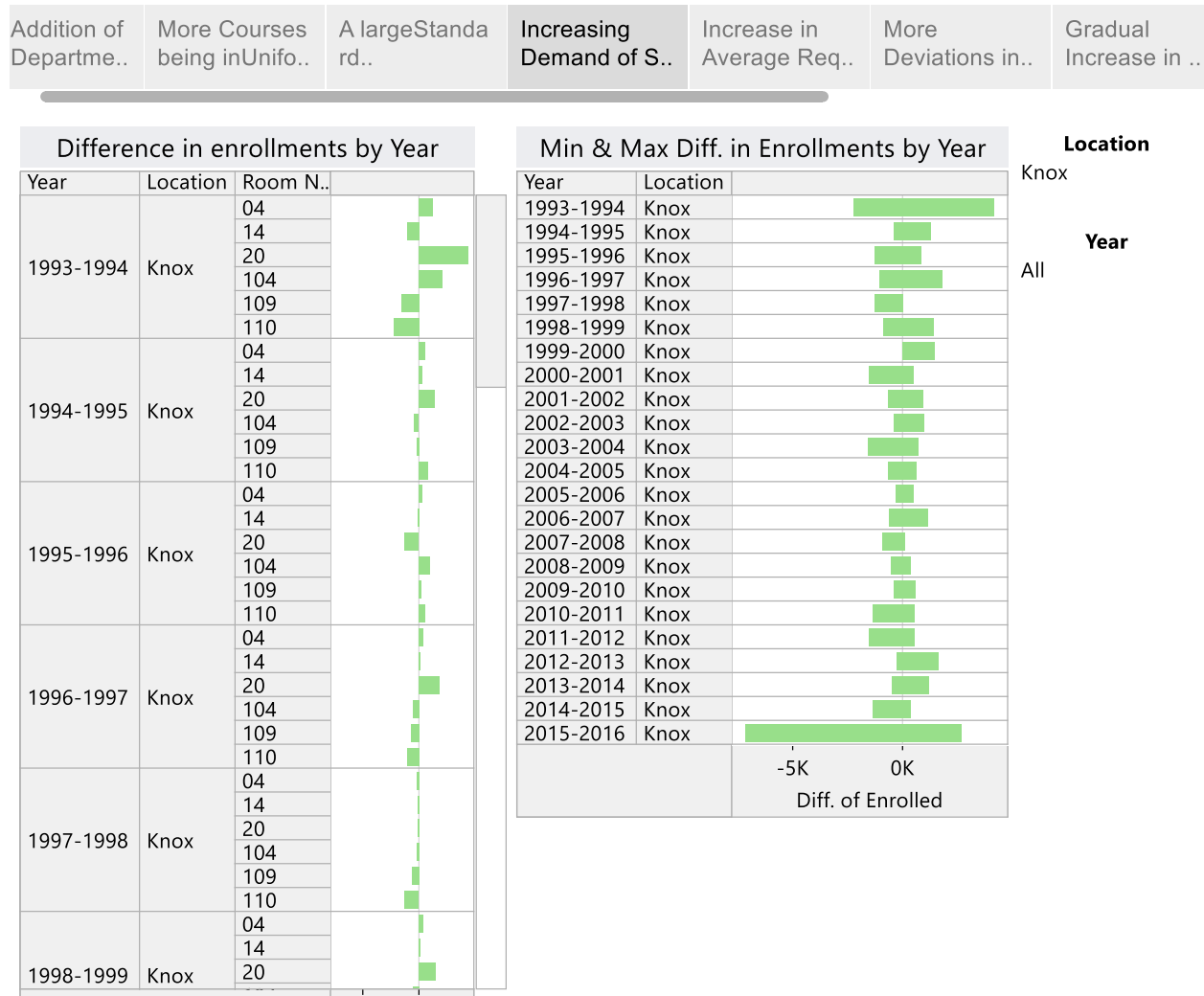


**Fig. 3 Dashboard 3: Comparison of Standard Deviation of Courses**

- The above data plot shows that over a decade course schedules are being adjusted to take care of the newly introduced courses which may limit the availability of resources and University facilities if this trend continues to grow over the decades. University should be very well informed about the growing demands of space and facilities. Also, we can see a similar trend over the weekdays that indicates that the most popular day in both Fall and Spring semester are Tuesdays and Thursdays while class schedules of other days of the week remains almost same for all the years.

#### 4. Increasing Demand of Some Room in a Location while Decreasing in Other

### Increasing Course demand & Availability of Resources..



**Fig. 4 Dashboard 4: Min and Max Difference in Enrolments**

- The above graph shows us that some building rooms are very popular among Professors and Researchers over all the years. This may be due to the fact that the room has large capacity which can hold the huge number of enrolments in a particular department. It may be also because these buildings have the latest facilities and equipment required to conduct the class for a course.

## 5. Increase in Average Requirement of Space & un uniform Distribution Of Conducting Courses in a Location.

### Increasing Course demand & Availability of Resources..



**Fig. 5 Dashboard 5: Average Difference in Enrolments by Year and Location**

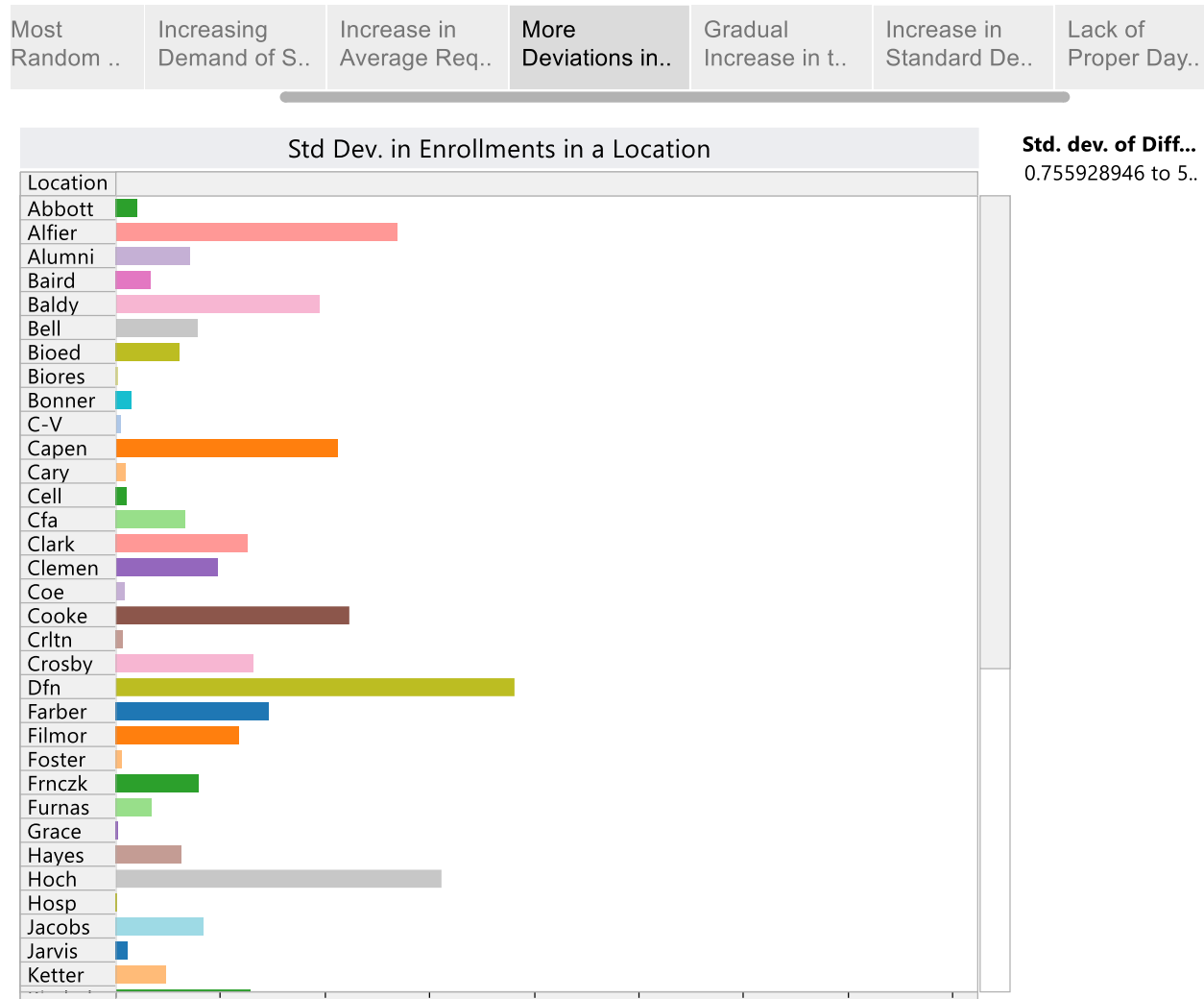
- The above data plot shows that Knox, Norton, Capen and Cooke has the maximum positive difference in enrolments after 2008 suggesting that these rooms have the latest facilities and technology gadgets like LCD projectors, document camera, portable mikes and speakers and hence are more preferred by Professors and students. The university should plan and improve the facilities in other buildings as well like install similar tech gadgets which will result in evenly distributing the class schedules and equally redistributing the university resources.

- Some of the halls like Wliksn, Wende has seen a more of increasing enrollments in the initial years while near constant after 2004 to 2013 suggesting hall has been used as customary classrooms and constraints of non-availability of more space in the hall is making for no room for the upcoming new courses being added in the curriculum. The average change in the rooms of these halls are near to zero in all the years after it is opened.
- Some of the halls like Ubcmns have seen a decreasing number of courses being held in the building over the years. Assuming the technological advancements every year and new courses being added require updated resources for the Laboratory. Assuming one such cause outdated resources must be updated in order to utilize the space that is being under-utilized over the last few years.



6. More Deviations in some of the Locations more Happening than in other. Facilities Available Should Be Confirmed with the Teaching Requirements

## Increasing Course demand & Availability of Resources..

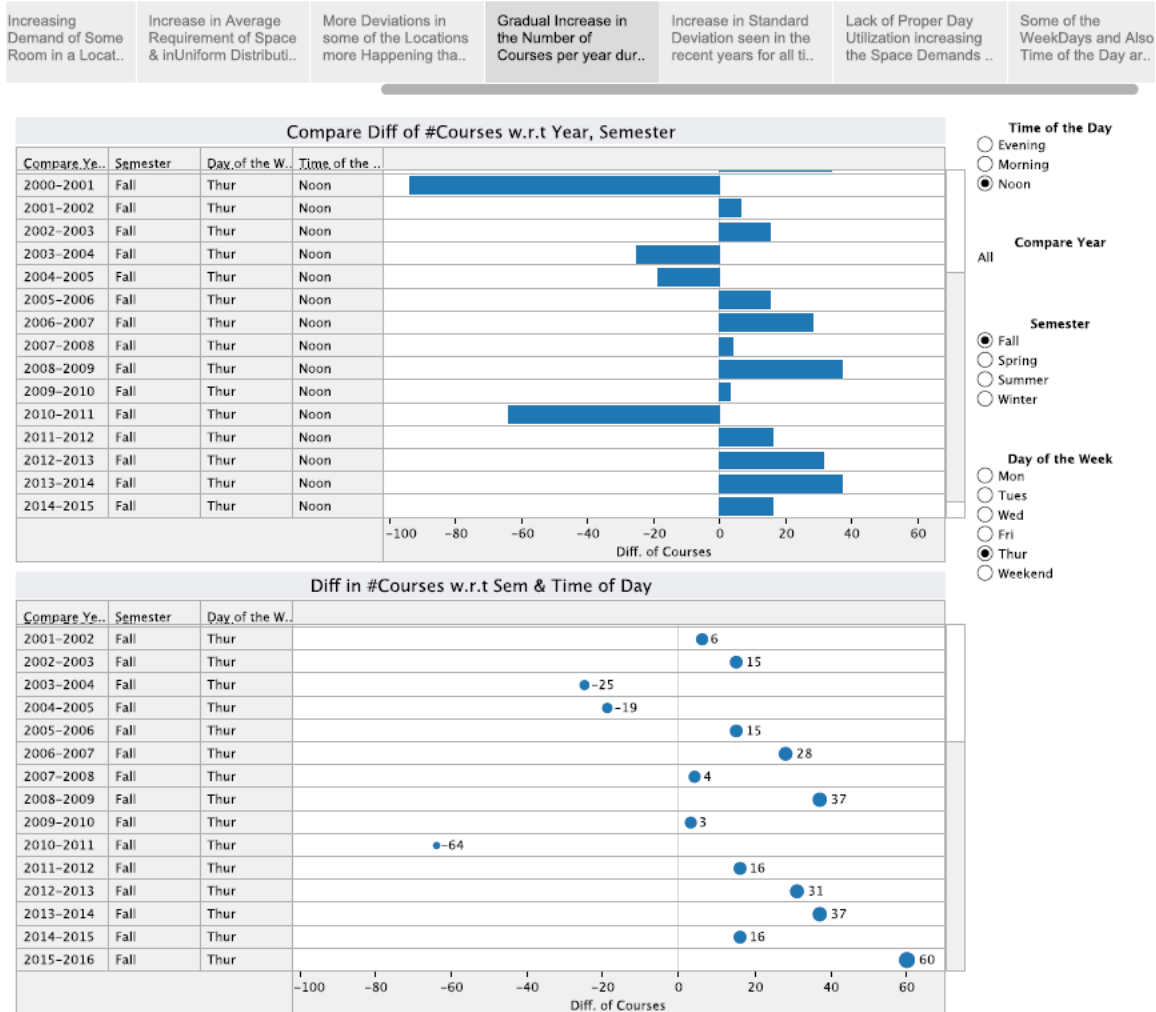


**Fig. 6 Dashboard 6: Std. Deviation in Enrolments in a Location**

- Some of the halls have very high standard deviation which shows a huge redistribution of classes over the years like Knox, Norton and Dfn. But there are other scenarios as well, where initially enrolments were gradually increasing like in Wende as seen in the analysis done in the previous data but after 2004 it became nearly stagnant. The initial large positive change in the enrollments of these Locations shows a large overall standard deviation and is misleading.

## 7. Gradual Increase in the Number of Courses per year during Fall Semester which may rise in coming years with the introduction of new courses

### Increasing Course demand & Availability of Resources at UB



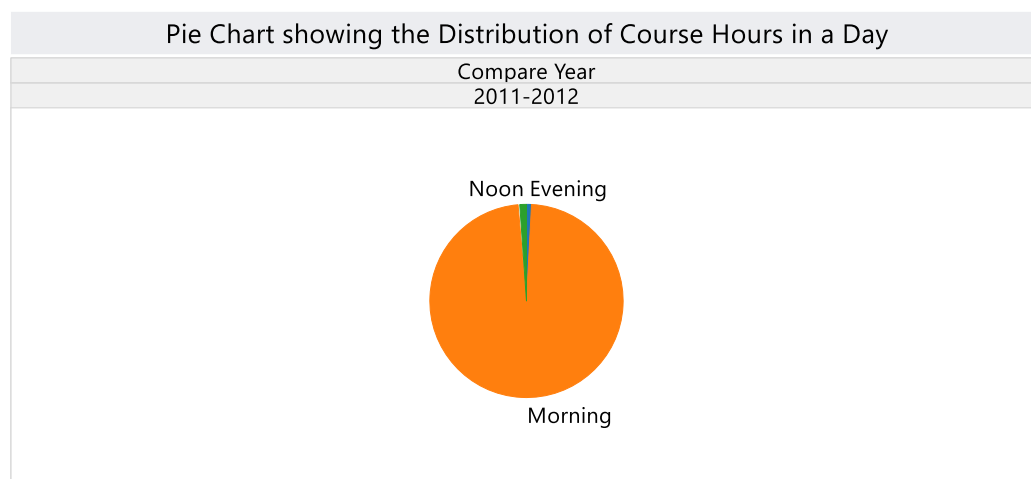
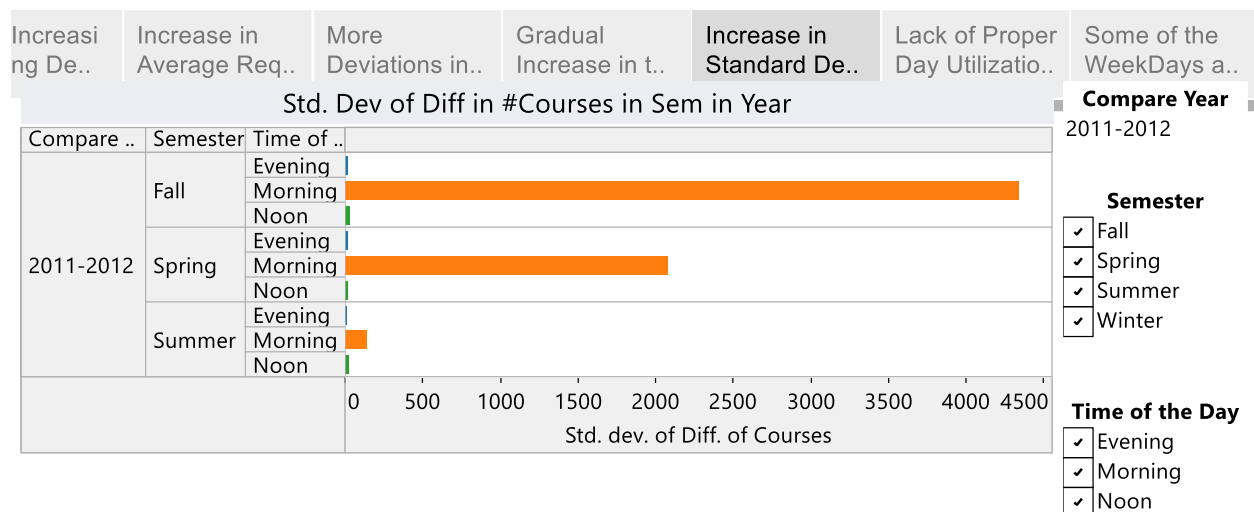
**Fig. 7 Dashboard 7: Comparison of Difference in Number of Courses in Year and Semester**

- During Fall semesters, Mondays, Wednesdays and Fridays are more preferred for scheduling of classes while we see that Tuesdays and Thursdays have comparatively lesser classes scheduled. This results in more clustering of courses on some days and other days being scarcely used. By this analysis we can assert that there is an improper planning of class schedule resulting in space scarcity at particular days of the week.
- Similarly, when considering time of the day of the most popular day of the week we see a pattern where a selective time of the day such as evening is less preferred and less courses are conducted in that period than in any other period of the fall and summers. In contrast a better scenario is

seen during the Spring semesters, all the days of the week have been equally scheduled for classes and no special patterns are seen in the data.

8. **Increase in Standard Deviation seen in the recent years for all time periods shows limitation of the available space in the preferred location in one Time period of the day must be causing Professors to look for other timings.**

## Increasing Course demand & Availability of Resources..



**Fig. 8 Dashboard 8: Std. Dev of Distribution of Course hours in a Day**

- After analyzing the above graphs, it can be noted that morning which was previously underrated and was not popular among other timings has become the most popular time for Professors to

schedule their classes after the year 2011. The year after which almost all the classes were scheduled in the morning.

- While there was a minimum deviation in the number of courses being scheduled during evening and noon remaining to near constant when compared to huge deviation in morning classes. This pattern is seen to be followed only in Fall and Summer semesters.

## 9. Increasing Number of Courses each year resulting in higher complexity in scheduling classes in some of the preferred Locations observed in previous analysis

### Increasing Course demand & Availability of Resources..

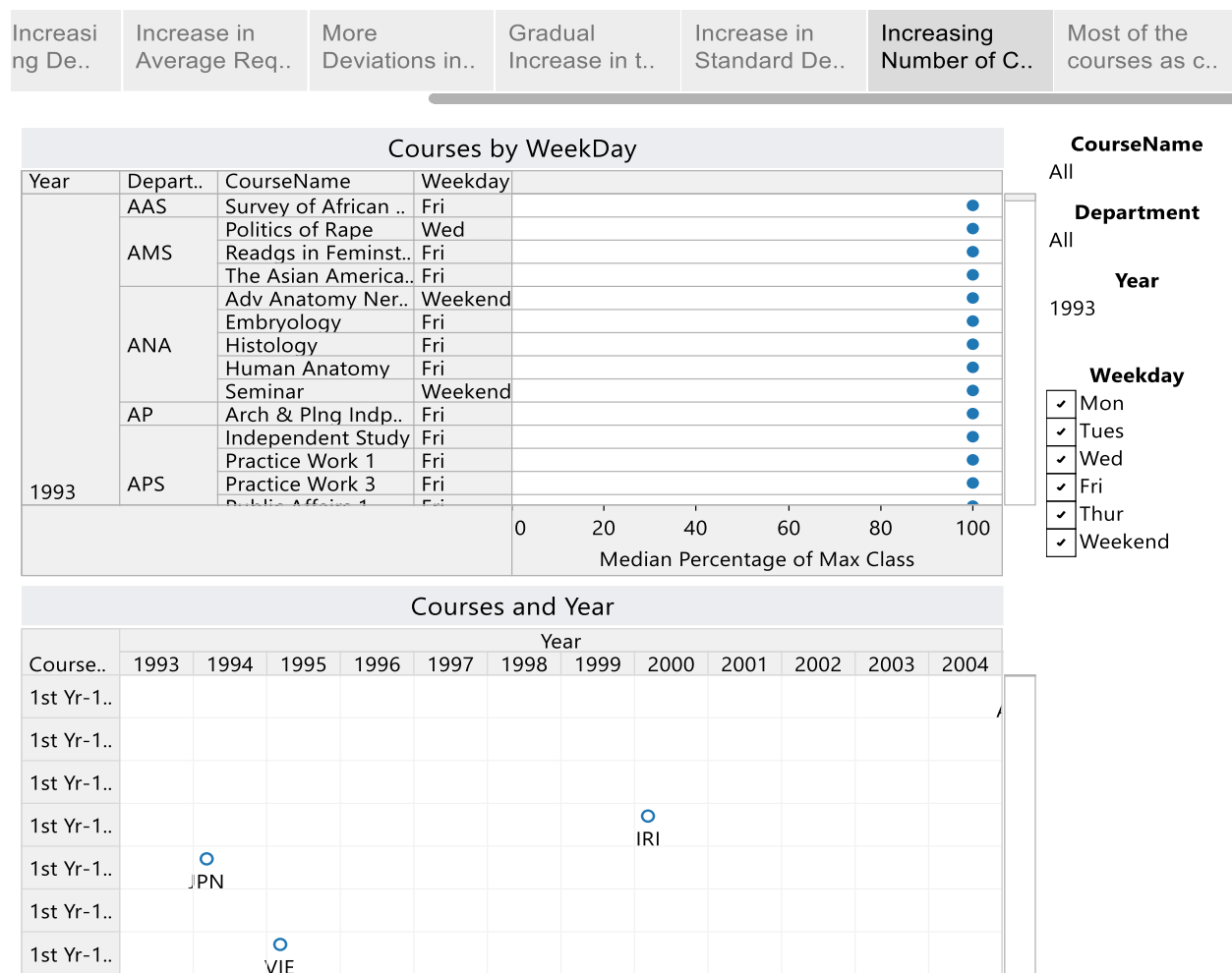
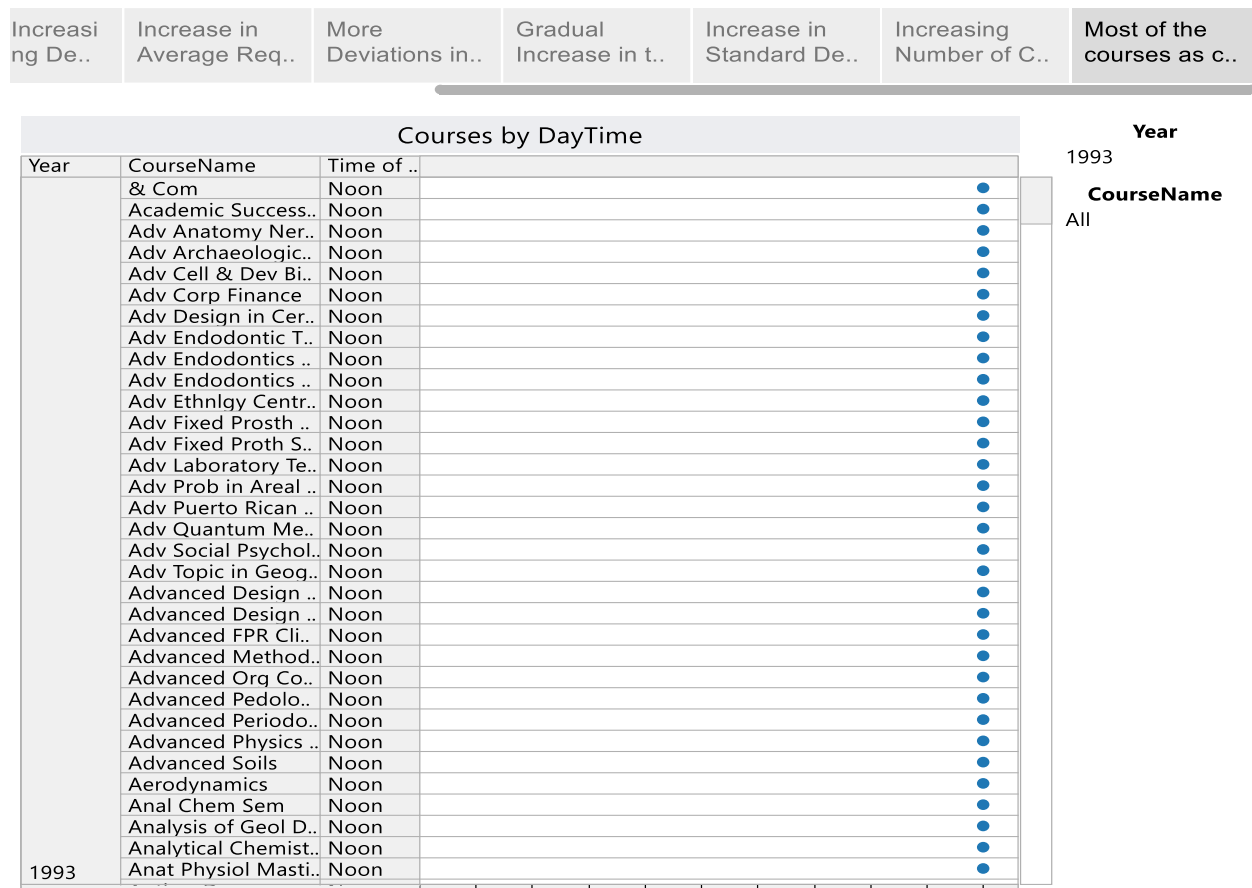


Fig. 9 Dashboard 9: Schedule of Courses by Year and Day of Week

- From the analysis of the above graph we see that most of the departments are scheduling classes at fixed time of the week resulting in class scheduling problem for departments.

**10. Most of the courses as can be observed from the graph are being conducted preferably on same time of the day causing under-utilization and un-necessary crowding of a particular timing**

## Increasing Course demand & Availability of Resources..



**Fig. 10 Dashboard 10: Schedule of Courses by Time of the Day**

- Since classes are being scheduled almost on the same time of the day, it causes un-necessary under-utilization of the other time of the days. Classes need to be distributed throughout the day to make sure that university resources are being optimally used and resources are not exhausted within a very short time in a week or month.