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Teaching analytics using SAS on Demand for Academics

Teaching Note

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Abstract

Faculty teaching courses in business analytics/predictive analytics have a variety of software options to deliver the content of their syllabi. SAS Institute made available to academia a special platform known as SAS on Demand for Academics that allows students and professors to benefit from state of the art analytics software. This teaching note aims at smoothing the learning curve for professors willing to use the SAS on Demand for Academics platform in business analytics classes.

Keywords: Business Analytics, SAS on Demand, Predictive Analytics

Introduction

Faculty teaching courses in business analytics/predictive analytics have a variety of software options to deliver the content of their syllabi. A non-exhaustive list of business analytics software vendors includes Oracle, IBM, SAP, Microsoft, Teradata, Informatica, Adobe, etc. One of the premier global providers of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets predicts the growth of revenue from selling business analytics software (Vesset, et al., 2014). Recent evolutions in software development have promoted the use of different software packages traditionally made for a specific purpose to incorporate elements that would allow business analytics operations (Kohavi et al., 2002). As such, software that can be used for business analytics can be encountered in real life as either open source (Weka, R) or proprietary solutions (IBM SPSS, Oracle Business Analytics), desktop solutions (Tableau Desktop) or web based solutions (SAS on Demand, Tableau Online), add-ins to existing software packages (Excel Add-in), etc. Each of these software packages come with some advantages and drawbacks when it pertains to their use in academia.

This manuscript presents the use of SAS on Demand for Academics platform as a potential solution for teaching graduate level classes in business analytics. The author of this manuscript shares his own personal experience in using one of the SAS on Demand solutions (SAS Enterprise Miner) for teaching a business analytics class in one of the Southwestern universities in the U.S. The manuscript presents basic information for an instructor to: (1) create a SAS account/log in into a SAS account, (2) create a new course and invite students to register, (3) install a SAS application package on personal PC, (4) create a first project using SAS Enterprise Miner (SAS EM), (5) upload data sets for the course, (6) DOs and DON'Ts, and (7) business success stories.

As SAS has recently made available online the SAS on Demand for Academics platform, the access to the expanded SAS software packages and is now available to a potentially increased number of students and professors. The advantages of using this platform are not minor. First, access to the software which can be used in statistics and business analytics classes in a diversity of domains including social sciences, economics, computer science, etc. is free. Second, since everything happens in the cloud, consequently, there are minimal software requirements to be installed on the user's computers. Third, the platform allows the professors to upload the data on SAS servers in a seamless way, and the students have easy access to the uploaded data. Fourth, SAS continuously expands the tools available on this platform to both

professors and students. Fifth, SAS offers free training courses to the instructors as well as free teaching and curriculum materials.

Creating an account with SAS on Demand for Academics

We recommend starting by using a search engine to look for keywords such as “SAS on Demand for Academics” or simply going to the homepage of the platform (http://www.sas.com/en_us/industry/higher-education/on-demand-for-academics.html). Once on the home page, at the top of the page the “Login” link directs the user to the login page for either creating a new account or logging in with existing credentials. For creating a new account, one needs to fill in the preferred language for the newly created profile, first name, last name, email address, company/organization, country, affiliation with SAS and has to agree with the terms of use and legal information from SAS. After the “Create Profile” button is clicked, the newly registered user receives an email with further information to complete the registration process. Figure 1 shows the webpage for creating a new account.

Login into SAS Logon Manager/Create an account

Here, we suggest using a search engine to look for keywords such as “SAS Logon Manager” or simply going to the homepage of the logon manager (<https://odamid.oda.sas.com>). The homepage ask the user to login with the user ID created during the registration process or to login with existing credentials. Figures 2 and 3 show the two available options.

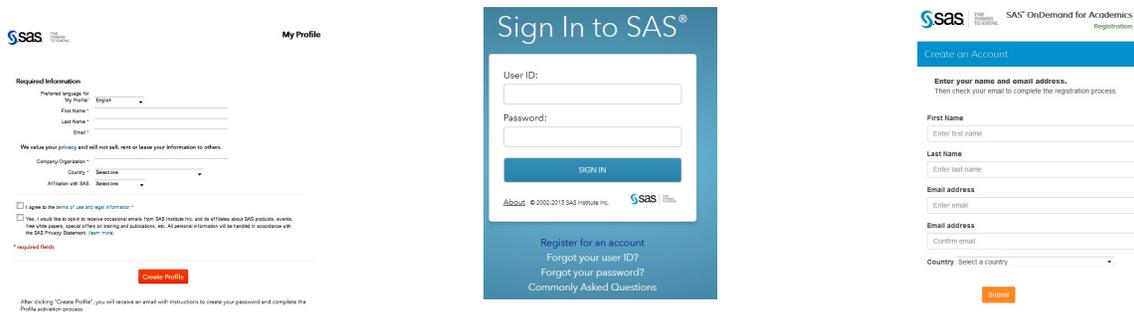


Figure 1. SAS General Registration Figure 2. Sign into Logon Manager Figure 3. Create Account on SAS

Once the login is successful, the user has access to the available tools on the SAS on Demand platform by being redirected to the SAS dashboard. At the time we wrote this manuscript, the following tools were available: JMP access to SAS Servers (only for the U.S.), SAS Enterprise Guide, SAS Enterprise Miner, SAS Forecast Studio, and SAS Studio. Figure 4 shows available applications.

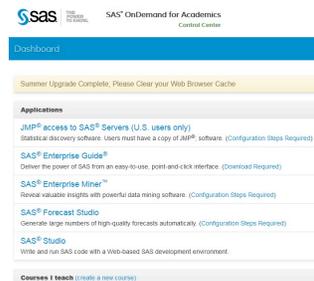


Figure 4. SAS Applications Dashboard

Create a new course and invite students to register

In order to create a new course, professors have to fill in the required information and select one of the software packages that will be used to teach the business analytics course. In addition to the desired software, it is important to add SAS Studio because SAS Studio allows the course instructor to upload new dataset files for homework, assignments, etc. In addition, SAS Studio allows the users to write and

run SAS code that can later be used in other SAS software packages. Once the course has been created a link to a folder for uploading/downloading data files is created just beneath the newly created course. The instructor can click on the “details” link of the course and important information is revealed such as course name, course description, course level, institution name, enrollment link for the students, and a link to a standard already created email content that can be sent as invitation to the students to enroll into the course. The link for uploading/downloading files along with the enrollment link is used in the content of the email sent to the students to register for the course. Figure 5 below (from SAS) shows the registration email content.

Sample E-mail

Dear User,

I'd like to invite you to enroll in my SAS OnDemand for Academics course. I plan to teach using the following software: *software application name*.

For the best experience, please register for SAS OnDemand for Academics first. To register, visit the following site: <https://odamid.oda.sas.com/SASODARegistration/>

After you have registered, please click the following course enrollment link to enroll in my course:
[Course Enrollment link](#)

I have also uploaded data for us to use in our course. You will be able to access that data using the following LIBNAME or FILENAME statement:
[Course Data path](#)

For more information about SAS OnDemand for Academics, including step-by-step registration instructions, visit the following site: <http://support.sas.com/ondemand/>

Regards,
 Your Name

Figure 5. SAS E-mail Sample for Students' Registration

Install application packages on PC

For configuring any application available on SAS on Demand for Academics the instructor has to click the configuration link shown in Figure 4 and follow the steps explained in the newly opened webpage. Basically, the instructor has to confirm that at least a JAVA JRE 1.8.0_45 (*jre-8u45-windows-i586.exe*) runs on its PC. Once the JAVA version is confirmed or an older version is upgraded to at least the JRE 1.8.0_45 version, the instructor then clicks on the “start SAS® OnDemand for Academics: Enterprise Miner™” and the selected application starts downloading. For example, for SAS Enterprise Miner 14.1 the downloaded file has a size of 200MB. The download time varies based on internet speed connection and PC characteristics. After the download is completed, it is recommended to create a shortcut to the downloaded file. For this, the instructor goes to the JAVA Control Panel and clicks on the “View” button. After that, select the SAS Enterprise Miner application and click on the third button (circled in the figure below) showing a curved up arrow to create a shortcut on the desktop for SAS Enterprise Miner (see Figure 6). The shortcut icon looks like the image appearing to the left of the “SAS Enterprise Miner” words in Figure 6.



Figure 6. Java Control Panel and Cache Viewer for MS Windows 7 and SAS Enterprise Miner

Create a first project (e.g. running linear regression)

Creating a new project starts by clicking on the SAS Enterprise Miner 14.1 shortcut and logging in. The initial dialog screen appears. Following the wizard, the instructor first adds to the project the link to the data source folder assigned by SAS during the course registration (e.g. **libname mydata "/courses/d4f54df5ba37fe300" access=readonly ;**), and after that adds a data source. A “Data source” node is created inside the project main window. In order to run regression, a “Regression” node is added to the project and connected to the data source node as shown in Figure 7. Right click on the “Regression” node and a popup menu offers the possibility to “Run” the analysis. Figure 7 below shows an example of a project.

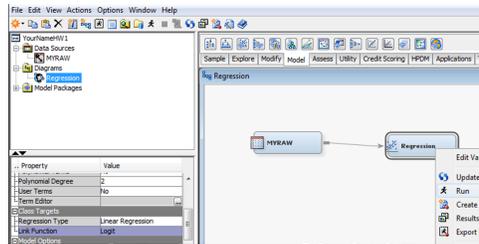


Figure 7. Sample Project created in SAS Enterprise Miner

Once the “Run” is executed, a little window appears containing an “OK” button and a “Results” button. By clicking the “Results” button we get four tables as showed in Figure 8. Notice the output windows reporting important information for the linear regression such as R-square, F-test, p-values, etc.

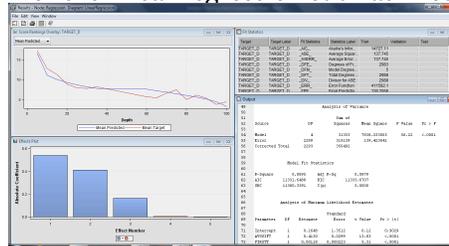


Figure 8. Results of Sample Project created in SAS Enterprise Miner

One advantage of using the SAS EM cloud platform is that allows students to focus on the interpretation of method results (e.g. linear regression) and the applicability of the results in real life as opposed to focusing on the technical details of the method.

Uploading your dataset in the cloud

The easiest way to upload your data tables on SAS EM is by using another tool named SAS Studio. SAS Studio can be required for a class at the same time alongside SAS EM. Once the instructor logs into SAS Studio he/she needs to create a permanent library that will be connected to a virtual location on SAS servers. For example, the following command creates a library named “MYDATSET” and associates the library with the “Course Data Path” location known to the students from the invitation email to the course:

```
libname mydataset '/courses/d4f54de2ba37fe300';
```

After this step, in the list with “Libraries” will also appear “MYDATSET” as a new library. Remaining in SAS Studio the instructor has to go to the “Server Files and Folders” and create a new “Folder Shortcut” that will be associated with the corresponding path of the libname (**/courses/d4f54de2ba37fe300**). From now on the instructor can upload new data tables on the server by just using the shortcut folder and the upload option available in SAS Studio. The **libname mydataset '/courses/d4f54de2ba37fe300';** command is also necessary to be introduced in the “Project Start Code...” location of each project. In this way, the student (user) has access to all the uploaded data tables. Figure 9a and 9b shows the information described in this section.

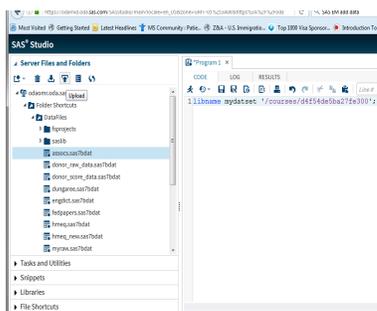


Figure 9a. Create library, shortcut folder and upload data

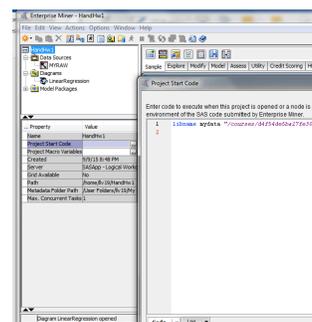


Figure 9b. Enter library in Project Start Code

DOs and DON'Ts

1. Do install SAS Studio at the same time with SAS EM
2. Do make sure the classroom has high speed internet connection
3. Do make sure that students have powerful laptops if they choose to use the laptops for the course
4. Don't use other versions of JAVA than the one recommended. It can work for a while, but sooner or later you'll experience difficulties in opening and running SAS EM.
5. Don't run SAS EM in embedded virtual environments. It works slowly.
6. Don't forget to make the access to the library read only to protect your data.

Businesses success stories

The benefits resulting from the usage of SAS on Demand platform in the business world are more than well known. In the analytics field, companies such as Bank of America, Kelley Blue Book, and True Car are evidences of success stories. In the field of business intelligence, the usage of SAS on Demand platform helped companies such as DirectTV, University of New Hampshire, and DirectPay. Other companies such as Chico's, China Citic Bank, and HP have successfully used the SAS on Demand platform for customer intelligence.

Since there are evidences that businesses can benefit from the usage of SAS on Demand platform one may conclude that the industry is looking forward for specialists with such knowledge in the field. Hence, using SAS on Demand platform can be beneficial to both academia and students graduating with such knowledge.

Conclusion

The author of this paper is in the third year of teaching the course using SAS on Demand for Academics software. Overall, the experience has been a positive one from an instructor's point of view as well as from the students' point of view. As one student noted "SAS EM projects helped me understand the concepts practically." The environment is easy to use and allows the instructor to be efficient in delivering the teaching material to the students. Students, on the other hand, can focus more on the interpretation of the results as well as creation of different models. A discussion with the students at the end of the course revealed that students appreciate the availability of the free SAS resources for learning the content of the course. They also found the book *Getting Started with SAS Enterprise Miner* "rich in examples that helped them during the semester."

The author of the paper would like the reader to perceive this initiative more like an alternative to already existing choices for delivering business analytics courses at the graduate level. SAS on Demand for Academics can be a strategic choice for instructors because of the ease and usefulness of this tool and the powerful support from SAS including free teaching materials, free access to the software, and free training courses for both instructors and students. As an example, this manuscript was created using SAS materials (e.g. all figures in this manuscript) and SAS on Demand for Academics website. Last, but not least, this manuscript can be used as a guide for instructors who, for the first time, want to teach their business analytics classes using SAS on Demand for Academics.

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