

Fall 2013

# [Sabbatical Report]

Jun Yan

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Memo to: Dean Cheryl Stevens, Ogden College of Science and Engineering

From: David Keeling, Department Head, Geography and Geology - *David J. Keeling*

Subject: Sabbatical Report, Dr Jun Yan

Date: January 7, 2014

As required by WKU sabbatical policy, please find attached the sabbatical report for Dr. Jun Yan, who completed his Fall 2013 leave on December 15, 2013. In accordance with sabbatical policy requirements, I approve this report and commend him for making good progress on a very sophisticated research project. Dr Yan has pledged to have the results of this detailed data mining project submitted for publication by the end of the calendar year. In addition to the air-traffic project, Dr. Yan also completed final editing on a co-authored paper originating from a graduate student thesis, which contained some sophisticated GIS modeling techniques. This paper has been published in *Applied Geography*, which has an impact factor score of 3.08 – in the upper third of impact journals in the geographical sciences. In addition, Dr. Yan indeed invested a significant amount of time during the sabbatical leave period in bringing a graduate student thesis to completion by December 15<sup>th</sup>, and on getting another student closer to completion. He also invested significant time serving on the thesis committee of a third student, who graduated in December. I am satisfied that Dr. Yan's sabbatical leave outcomes met the objectives he laid out in his sabbatical application. I would have liked to have seen an additional paper or a competitive grant submitted during the sabbatical leave, but Dr. Yan did accomplish his core goals.

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**Jun Yan, Ph.D.**  
**Associate Professor**  
**Department of Geography and Geology**  
*Sabbatical Report*

During my sabbatical leave (Fall 2013), I have mainly worked on the project to explore the dynamics of the U.S. domestic airline market. This project focuses on geographic changes in the U.S. domestic airline market over the past two decades (1993-2012) at the level of city-pair directional markets. The primary goal for this project during my sabbatical is to prepare and process data for further analysis in the coming years. Overall, the project has been going well. After overcoming an early unexpected obstacle due to software compatibility, I have reached most of my goals set at the beginning. In sum, I was able to accomplish the following tasks:

- 1) **Data gathering and processing:** Overall more than 160 million records of airline tickets (10 years, 2003-2012) were downloaded from the Airline Origin and Destination Survey Database (DB1B) Market Table. This database contains a wealth of information in fine geographic detail (origins and destinations at the airport level) for each sampled ticket, including origin, destination, operating carrier, miles flown, market distance, airfare, etc. All these tables, added up together, are more than 20GB. In order to be analyzed, the individual tickets were then aggregated to the level of city-pair directional markets. To achieve this, additional data were downloaded and processed from the U.S. Census Bureau. In the end, there are close to 200,000 city-pair directional markets, and about 40 domestic airlines

reported their data to BTS during the study period. The data converting process involves several steps and is very time consuming. So far, I have aggregated the data in most years. I will finalize data processing in the spring semester.

- 2) **Data mining and visualization:** The original Matlab codes (written during my dissertation study) were refined for the purpose of this project. They were tested on selected subsets of the old data as well as the newly-processed data. In addition, a few maps were created to show visually the city-pair directional markets for U.S. domestic airlines. The initial results are promising.

The successful implementation of the entire project solely depends on the data. I feel very optimistic about this. Once the data are ready and finalized, I will continue to the next phase of this project, data analysis. I also plan to prepare one manuscript for journal publication by the end of this year to report findings from this project.

In addition to the above project, I spent considerable time directing successfully one Master's thesis, while supervising another. I also served as a committee member for two more Master's theses and both were successfully defended in December, 2013. Moreover, along with my co-authors, I revised and resubmitted one paper, titled "Drought and Corn in Kentucky." The paper has been published in the *Applied Geography* journal (Vol. 45). Lastly I also reviewed two papers for the *Journal of Transport Geography*. Although the above activities are not directly related to my sabbatical project, they also contributed significantly to the mission of the university and the college.