What is Operations Research? An Introduction to Linear Programming

Based on: www.INFORMS.org & Taha, H. A. 2017. Operations Research: An Introduction. 10th Edition. Boston, MA: Pearson

Andrés D. González

Assistant Professor
School of Industrial and Systems Engineering, The University of Oklahoma

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The University of Oklahoma, Norman, OK, USA

Operations Research & Analytics

Operations Research (OR), a.k.a. **Management Science**, is defined as the scientific process of transforming data into insights to making better decisions. Usually involves:

- Actions related to design and/or operation of a system
- Scarce resources
- The construction of mathematical/computational models

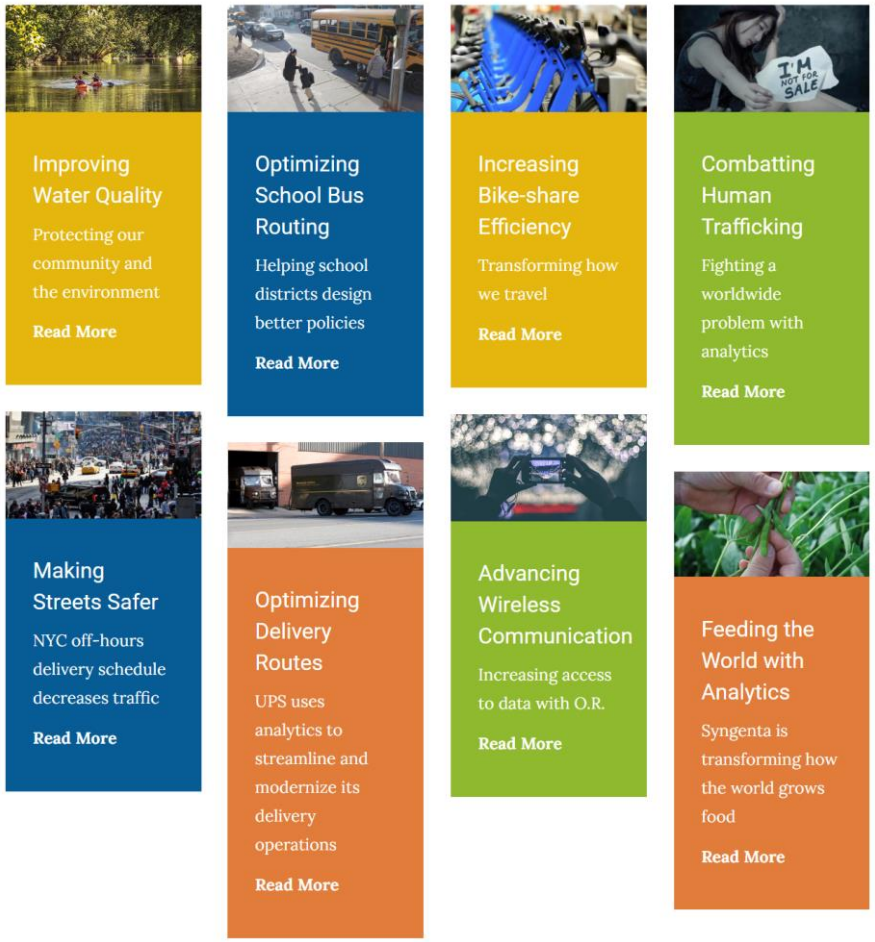
Analytics is the application of scientific & mathematical methods to the study & analysis of problems involving complex systems. There are three distinct types of analytics:

- *Descriptive Analytics*: gives insight into past events, using historical data.
- *Predictive Analytics*: provides insight on what will happen in the future.
- *Prescriptive Analytics*: helps with decision making by providing actionable advice.

Operations Research & Analytics

Fields related to OR and Analytics:

- Management science
- Data science
- Computer science
- Engineering (Industrial, Civil, Mechanical, etc.)
- Social sciences
- Political sciences
- Economics



Prescriptive Analytics (Mathematical Optimization Models)

An optimization problem refers to the problem of finding the best "feasible" solution

- A solution is represented by a set of **decision variables**
- The feasibility of the solutions is determined based on a set of **constraints** associated with the problem at hand
- To quantify the "quality" of a solution, you use an **objective function** (or a set of them)

Diverse classifications for optimization models:

- Static vs dynamic
- Linear vs nonlinear
- Integer vs noninteger
- Deterministic vs stochastic

How about some examples of optimization problems?

Linear programming

- Optimization associated with a system of linear constraints and a linear objective function

Example: Determining optimal paint production (The Reddy Mikks Company, Example. 2.1-1, Operations Research: An introduction - Taha)

THANK YOU

QUESTIONS?

Andrés D. González | andres.gonzalez@ou.edu