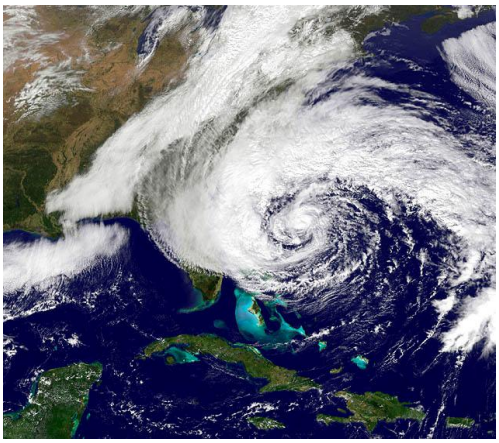
Call Center for Hurricane Sandy

You are the manager of the National Grid Power Company call center and are evaluating your process. You know Hurricane Sandy is coming, so you have to figure out how to staff the call center in order to handle the influx of calls from customers saying their power is out and asking when it will come back on.



In order to make customers happy, you need to staff the call center so that the wait time to talk to a customer service representative is not too long, we will call this maximizing responsiveness.

On the other hand, your boss does not want you to spend money on unnecessary staffing if they are not utilized. Instead, your boss wants you to staff accordingly so that you are efficient, we will call this maximizing efficiency.

These are two conflicting objectives because if you staff a lot of people the responsiveness goes up, but efficiency can go down because it costs more. To see the trade off between the two objectives you must create the efficient frontier of points.

You have 7 workers. Let x1, … , x7 be binary variables that equal 1 if that worker is hired. The two integer programming models are then as follows:

Responsiveness

max 25x1 + 67x2 + 40x3 + 75x4 + 50x5 + 10x6 + 80x7
s.t. 2x1 + 8 x2 + x3 + 4x4 + 6x5 + 3x6 + 10x7 <= 15
x1, …, x7 in {0, 1}

Efficiency

max 75x1 + 25x2 + 50x3 + 45x4 + 50x5 + 77x6 + 33x7
s.t. 2x1 + 8 x2 + x3 + 4x4 + 6x5 + 3x6 + 10x7 <= 15
x1, …, x7 in {0, 1}