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ISYE 6501
HW13

1. Determine delinquent customers' ability to pay.

Given:

- Account Holder's credit score
- Reported income
- Home price or median home price of neighborhood or subdivision (based on public tax records),
- On-time rate of past payments (if the customer frequently pays late or frequently pays on time, these both indicate the ability to pay)
- Type of non-payment. A rejected auto-draft shows the willingness to pay and assumption of available funds, but perhaps not the funds at the current time vs. no manual cash/check payment

Use: A SVM to classify the customers. The error and margin can be weighted on numerous factors such as:

- Public perception of mistakenly turning off power for people that can't pay. E.g. what is the cost of misclassification?
- Seasonality: being more likely to move people to "not able to pay" during extreme cold/hot seasons when shutting off power could have major impacts on the customers/family

To: Determine which customers have the ability to pay, and which cannot. Those who cannot pay are then eliminated from the results and put into a special assistance program

2. Who will and won't pay

Given:

- Customers from (1) that were determined to be able to pay
- on-time rate of past payments (if the customer frequently pays late or frequently pays on time, these both indicate the willingness to pay)
- response to any overdue notices
- ownership of home vs. rental
- length of account activity

Use: Logistic Regression

To: Determine the probability that a customer who has not paid yet will pay in the short term future.

3. Cost of Not Turning Power Off

Given:

- Customers from (2) that were determined to meet some threshold probability of not paying
- Customers' historical usage, if available. If not, Can use an average of similar size homes in the immediate area as a proxy.
- Historical weather data for the upcoming month

Use: Exponential Smoothing with Seasonality

To: Forecast next month's usage from the customer in question

4. Determine Which Customer's Power to Shut Off

Given:

- Customers from (2) that were determined to meet some threshold probability of not paying
- Cost from (3) for the customer's that won't pay
- Number of technicians available to shut off power
- Physical address of the customer in question

Use: K-means clustering, where k = number of available technicians

To: Find clusters of non-paying customers within a certain geographical distance of each other where the average cost savings per shutoff is higher than the assumed cost of the technicians' time.

5. Minimize shutoff cost

Given:

- The clusters from (4)
- Roads/Routing information
- Traffic data

Use: Routing simulation and optimization

To: Minimize the travel time between sites while selecting the customers within the cluster that maximize the cost savings given the constraint of working hours in a day for the technicians.