Crying for Help: Using Predictive Models to Handle Struggling Callers

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Overview

• In a typical IVR, handling of caller difficulty is uniform

• This simplistic approach leads to sub-optimal results:
  i. Some callers hang up in frustration (and may never call back)
  ii. Others who would have happily completed the call are transferred prematurely

• The solution is a transfer strategy based on a caller experience metric that predicts the likelihood of call success
Introducing the Experience Metric

- Scores the current satisfaction level of the caller experience:
  i. Gives a reward for positive events: e.g., completing a turn successfully
  ii. Gives a penalty for negative events: e.g., no matches, rejections, agent requests
  iii. Considers a call’s entire event history, but assigns more weight to recent events

- Predicts the likelihood of overall transaction success:
  i. Callers who breeze through the system are likely to complete even when they encounter occasional problems
  ii. Callers who experience repeated minor difficulties (none of which are sufficient to transfer the call) are likely to hang up in frustration
Constructing the Experience Metric ($\mu$)

Computed in real time

$$\mu_{i+1} = \alpha \mu_i + value(\tau_{i+1})$$

$$\mu_0 = 0$$

Where

$\alpha$ is the discount parameter

$value(\tau_{i+1})$ is the satisfaction score for the $i$th dialog turn
Case Study: Airline Fare Shopper

- Search *Transaction*
  i. One-way/roundtrip?
  ii. Departure City/Airport
  iii. Arrival City/Airport
  iv. Departure Date
  v. Return Date
  vi. Auxiliary dialogs based on business rules
Sample call with low Experience Metric

| round trip | Departure City NM | Departure City NM | Departure City NM | yes to TryAgain | Departure City MM | Rejection | Departure City MM | Rejection | Departure City NM | Departure City NM | Departure City NM | Departure City NM | Departure City NM | Departure City MM | Rejection | Departure City NM | Departure City NM | Departure City NM | Departure City NM | Departure City NM | Departure City NM | Departure Date MM | Rejection | Departure City NM | Departure Date MM | Confirmation NM | Rejection | Etc.... |
Constructing the Experience Metric (μ): Choosing the right ingredients

Max Predictive Power

- without rewards
- without agent
- best
Evaluating the Experience Metric ($\mu$): Transaction Results
Evaluating the Experience Metric ($\mu$): Predictive Power

% correct predicted outcomes

Experience Metric ($\mu$)
Effects of transfers based on $\mu$-threshold: Mean caller experience
Effects of transfers based on $\mu$-threshold: Mean caller experience

% change

$\mu$ - threshold
Effects of transfers based on $\mu$-threshold: Additional Transfers
Future Directions

- Automatic setting of model parameters
- Automatic selection of thresholds based on high-level policy settings
- Initializing $\mu_0$ from a database of previous calls
- Specialized prompting for “at-risk” callers
Questions?

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