
Decision Making Problems with Funnel Structure: A Multi-Task Learning Approach with Application to Email Marketing Campaigns

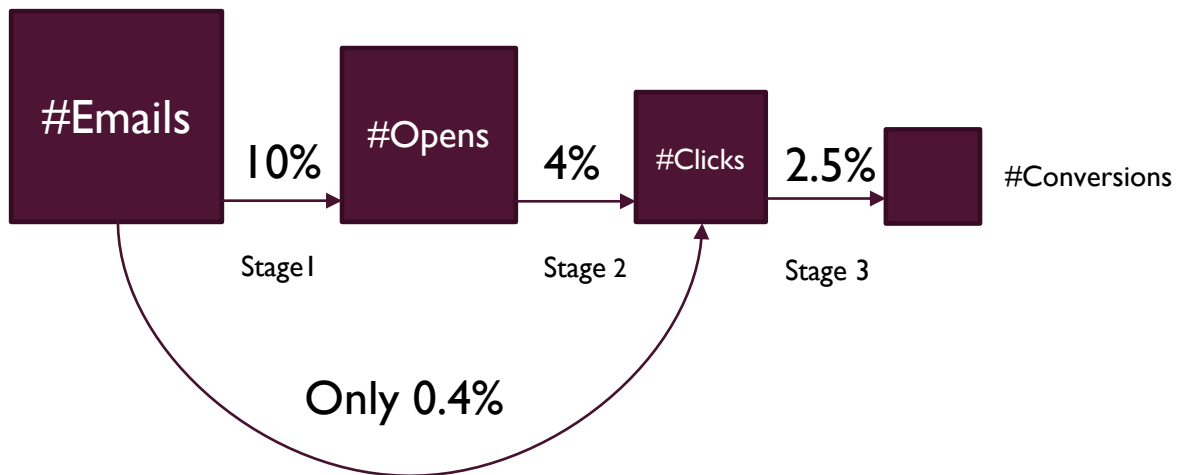
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Funnel Structure and its Challenges

- A sequence of binary outcomes with decreasing number of observations.



- Example: email campaign problem
 - The total prediction error of the whole funnel is restricted by the # of observations in Stage 3.

Our Contributions

- Supervised learning:
 - Proposed a multi-task learning method that utilizes the structural information of the funnel;
 - Showed that the sparsity can be overcome under some assumptions.
- Contextual bandit for decision making:
 - A multi-task learning algorithm with optimistic exploration.
- Experiments:
 - Improved performance on simulated environment;
 - Experiments on real email campaign data.

Experiment Results

	Random	Target	Mix	Seq.	Multi Cluster	Multi Seq.
Purchase	0	0.0409	0.0423	0.021	0.0634	0.0106
Click	0	3.88	6.63	0.981	0.753	2.04
Open	0	24.6	47.0	0.495	-18.1	3.03

Average increase in the number of Purchase, Click or Open over 10000 steps based on Random policy.

