Conversion Prediction Using Conditional Attention Networks to Support the Creation of Effective Ad Creatives

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Contributions

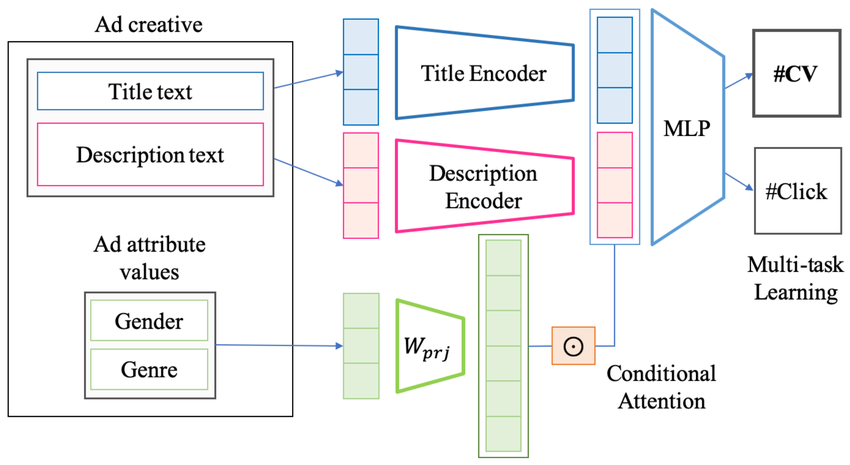
1) Propose a new framework that includes two key strategies to improve the prediction performance of ad conversion.
   a) **Multi-task learning predicts conversion, together with clicks as its prior action, by learning common feature representations.**
   b) **Conditional attention focuses attention on the features of each creative text considering the target gender and genre.**
2) Propose an attention highlighting offers important words to support the creation of effective ad creatives based on the conditional attention.

Background

To support the creation of ad creatives with many conversions, and we propose a new framework for these support, including accurate prediction of ad creative text conversions in advance.
We focus on text, because it is difficult to replace ad images, but easy to replace text in the creation of ad creatives.

Method

The proposed framework consists of three key ideas:
Multi-task learning, conditional attention, attention highlighting.



Multi-task learning is an idea for improving the prediction accuracy of conversion, which predicts clicks and conversions simultaneously, to solve the difficulty of data imbalance.

Conditional attention calculates self-attention, using feature vectors obtained from the ad attribute values.

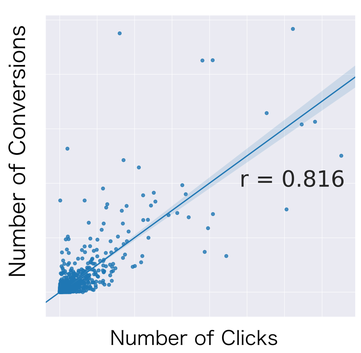
Attention highlighting visualizes important words and/or phrases based on conditional attention.

Dataset

Dataset 14,000 Japanese ad creatives by Gunosy Ads from Aug. '17 to Aug. '18.
Removed creatives with low number of impressions.

The frequency of conversion is quite low.
→ Definitely i**mbalanced.**

The number of conversions and clicks are **highly correlated.**
→ Predicting conversion along with click leads to improve model accuracy.



Experiment

For ad creative evaluation, campaign based 5-fold cross validation was performed. So we confirm the generalization performance for the unknown campaigns. But there is a problem with MSE.
All predicted as zero showed **sufficiently low MSE**. Therefore **MSE is NOT suitable** in this study.

Model		MSE			
		All		#CV >0	
		Single-task	**Multi-task**	Single-task	**Multi-task**
MLP		0.01712	0.01698	0.04735	0.03199
GRU	Vanilla	0.01696	0.01695	0.04657	0.04355
	Attention	0.01685	0.01688	0.04695	0.03105
	Conditional attention	**0.01683**	**0.01675**	**0.04641**	**0.02825**
All predicted as zero		**0.02148**		–	

For solving the problem, we adopted **NDCG**, which is evaluation metrics for ranking.

For the creation of high-performing ad creatives, rather than predicting zero conversions, we would like to accurately predict high-conversion creatives as such.

Model		NDCG [%]			
		All		#CV top 1 %	
		single	**multi-task**	single	**multi-task**
SVM		96.72		83.73	
MLP		96.68	97.18	82.97	84.12
GRU	Vanilla	96.54	97.00	76.39	78.51
	Attention	96.76	97.11	83.00	85.49
	Conditional Attention	**96.77**	**97.20**	**87.11**	**87.14**

With the **multi-task learning** (simultaneous estimation of clicks and conversions) and the **conditional attention** (consideration of the ad attributes), the model showed better performance on conversion prediction.

Discussion

Visualization for ad creative creation

Changes in attention when the distribution target is changed.

For All: -1 0kg の ダイエット に 成功！痩せる 理由 は これ 女子 に 人気 の 方法 で 効果 を 実感
For Women: -1 0kg の ダイエット に 成功！痩せる 理由 は これ 女子 に 人気 の 方法 で 効果 を 実感
For Men: -1 0kg の ダイエット に 成功！痩せる 理由 は これ 女子 に 人気 の 方法 で 効果 を 実感

The word "女子" (girls) contributes to the conversion prediction. If you change the delivery target to male in this creative, the attention score and predicted conversions will be smaller than for all targets or women.

Success in -10 kg weight loss! This is the reason for getting slim.
Realizing the effects popular among girls.

For All: 有名 芸能人 監修 。 簡単 に できる 料理 レシピ 本 一人暮らし の 男性 に も おすすめ！
For Women: 有名 芸能人 監修 。 簡単 に できる 料理 レシピ 本 一人暮らし の 男性 に も おすすめ！
For Men: 有名 芸能人 監修 。 簡単 に できる 料理 レシピ 本 一人暮らし の 男性 に も おすすめ！

The words "一人暮らし" (living alone) is an expression that narrows down the delivery target and is known to be effective for ad creatives. This example shows that the word "男性" (men) is an important factor when the delivery target is men.

Supervised by a famous celebrity; easy cookbook.
Recommended for men living alone!

→ If the words contributing to conversions are clarified, advertisers will be able to easily create high-performing ad creatives.

Future Work

We will build a framework that simultaneously uses images attached to ad creatives, and aim to improve the accuracy of conversion prediction.