GrammAds: Keyword and Ad Creative Generator for Online Advertising Campaigns

Digital Enterprise Design & Management 2013

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Outline

1. Preliminary Online Advertising Concepts & Related Work

2. GrammAds Prototype: Motivation and Objectives

3. System Description & Experiments

4. Future Work and Discussion

Participants/Players of the Online Advertising Ecosystem/Game

Auctioneer (e.g. Google)

- The auctioneer organizes the auction process/game/competition

Advertisers

- They want to promote a product or service
- Each advertiser wants to have better performance than the others
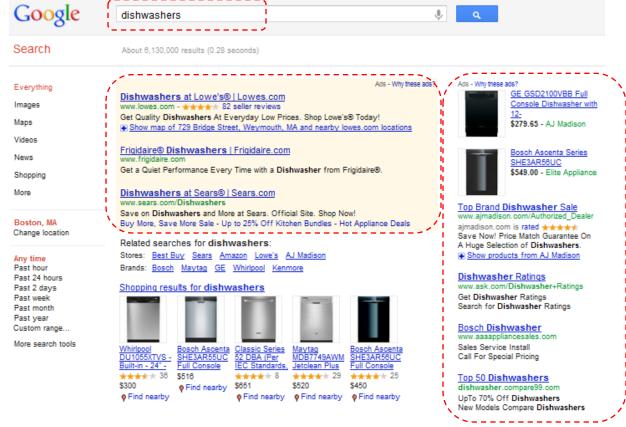
Publishers

- They give some space for ads in exchange of certain amount of money
- e.g. A website that uses AdSense

Users

- The advertisers want to attract their attention ☺
- The users may 1. search or 2. browse…

The case of Sponsored Search – Textual Advertising

■ Online advertising is gaining acceptance and market share while it has evolved into a $31 billion industry for advertisers [1]

■ The most profitable venue for online advertising has been search, and much of the effectiveness of search advertising comes from the "adwords" model of matching search queries to advertisements

• Organic or algorithmic (actual) results
• Promoted results (ads)

[1]: http://www.iab.net/AdRevenueReport

Useful Terms

- **Keyword**
  - A word or phrase that matches a web-user's search query and at the same time describes the advertised content

- **Ad-Creative**
  - The text that a user reads on an advertisement

- **Impression**
  - The appearance of an advertisement in a SERP after a user's query

- **Click**
  - The action of a user clicking on an advertisement

- **Click-Through-Rate (CTR) = Clicks/Impressions**

- **Conversion**
  - Action (e.g. purchase, registration) after arriving to a website

- **Campaign**
  - Set of general preferences and total budget for the advertising purpose

- **Ad Group**
  - Set of related 1. keywords, 2. ads, and 3. bids within a campaign

Baseline Campaign Creation Process

- The advertiser must have one or more products on a website that wants to be exposed to the public

- For each product there must be a landing page

- Select on which keywords (words or phrases) each product will be advertised

    - A good practice is to choose the most specific key-phrases possible, which usually consist of 1-3 words

- Create short, precise, and convincing ad-texts

- Keywords and ads belong to AdGroups (therefore similar context)

- Set budget per Campaign

- Bid: Decide the maximum cost-per-click of each keyword (how much each for this keyword may cost)

- **Google AdWords Auction Process**: position of an ad is decided based on

    1. The bid

    2. Quality score (relevance to the query and the landing page)

Case Scenario for a Manual Campaign of an Advertiser

- **Steps only for one landing page (one subject category AdGroup):**
    1. Keywords, Ads, Bidding options
    2. Monitor campaign performance & success

- **For a mid size 1 product campaign (i.e. 3 Adgroups – 30 keywords) the labor cost is ~ 30 person hours per month)**

- **Large Scale Online Advertising Campaigns**
    - Complex task for websites with online catalogs or Catalog Aggregators
    - e.g. fnac.fr

- **Objective for the Advertiser: Make the best investment**
    1. Relevant and qualitative keywords and ads, profitable options of bidding
    2. Gain more **clicks** or **conversions** subject to the constraint of the given budget

Related Work: Methods and Systems

1. Google AdWords Keyword Tool
   1. Mining of query logs – Suggest similar keywords – General keywords based on the classification of queries and websites

2. Other commercial tools (e.g. AdGooroo & Wordstream)
   1. Determine an advertiser's top competitors and then actively search for the keywords they are targeting

- These approaches may result to a recommendation set of keywords which are likely to be *general* and thus more *expensive*
  - More competition among advertisers for general keywords
  - The bid price is increased for achieving higher position of the ad

- Another approach: Start with Keyword Extraction from the landing page, then expand terms
  - TermsNet*: [A. Joshi et al., 2006]*
  - Wordy: *[V. Abhishek and K. Hosanagar, 2007]*

Our Approach – *Help directly the Advertiser*

- **Automate** all the lifecycle of an online advertising campaign
  - Main Novelty – Automatically adjust the campaign to the needs of the promoted website

- Keyword Selection & Ad Creative Generation: Cornerstone processes

- Experiment in real-world campaign data:
Google AdWords and its API – Upload all settings on AdWords
  - The GrammAds module was developed in the context of an overall automated solution for creating and optimizing a Google AdWords campaign *[K. Liakopoulos, S. Thomaidou, and M. Vazirgiannis, 2012]*

> The goal is to offer to the advertiser
> an integrated solution for his objectives

System Flow

Advertiser

Inserts

Main website or .CSV with landing pages

Crawler: Retrieves links from the main website

or

Aggregator: Imports links from the .csv file

Keyword Extraction	Keyword Suggestion	Ad Creative Generation
• Extracts bid phrases from the HTML Document	• Suggests extra terms using Search Engine Snippets	• Produces a typical sentence for an ad

Keyword Generation

1. Keyword Extraction

   - *Corpus independent approach* to rely solely on the given landing page document

   - Preprocessing HTML: Parsing and stopword removal

   - For each word (unigram) in the tokenized output, we compute their relevance (using special tag weights)

   - Co-occurence discovery process: For top unigrams we pull together possible combinations of two-word and three-word phrases (bigrams and trigrams)

2. Keyword Suggestion

   - Keyword is entered as a query into a search engine API

   - API returns a set of *short text snippets* relevant to the query

   - Exploit them for term expansion

   - *Why use snippets?* Faster, more compact

■ More detailed presentation of this component in *[S. Thomaidou and M. Vazirgiannis, 2011]*

Ad Creative Generation

- New challenge in Natural Language Processing and Information Retrieval areas *[E. Gabrilovich, 2011]*

- Extract all the text from the HTML document

- Summarize to keep the most important meaning for the description of our advertising page

- Using a Bayesian Classifier (Classifier4J) keep *the most important sentence*

- Divide the sentence into the description lines

- Compress / Cut exceeded words (e.g., removal of stopwords such as "and", "with")

- Append an *Action Phrase*
  - Call-to-action phrases: e.g. "Order now!", "Book now", "Be informed"
  - Encourages users to click on the ad

Use Cases of the Proposed System

- **Advertising Goal**

  1. No Optimization: the system just uploads automatically the generated keywords, ad-texts, and proposed bids along with their organized structure

  2. Traffic Optimization: Optimize for clicks

  3. Profit Optimization: Actual monetary profit from offline product sales or online conversions

- **Type of Promotion – Feedback for Action Phrases**

  1. Website/Brand-name

  2. Product

  3. Service

K. Liakopoulos, S. Thomaidou, M. Vazirgiannis. The Adomaton Prototype: Automated Online Advertising Campaign Monitoring and Optimization. In Eighth Ad Auctions Workshop, EC'12
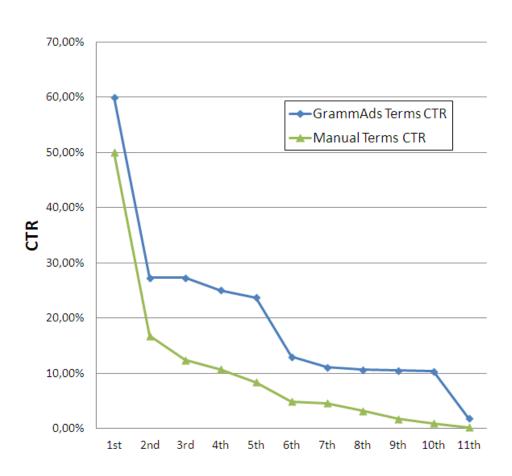
Campaign Organization: Description of Steps

1. Account Authorization using OAuth 2.0 Protocol

   - Easier access to the information of the clients
   - More straightforward way for a new client to sign up, login, and use our system

2. Target on Search network, opting-out the same time from the Display Network group

   - Display Network was leading to a large amount of impressions and very few clicks. As a result the values of CTR (Clickthrough rate) were very low (< 0.5%) causing in this way low Quality Scores and increased recommended bids for good ad slots

3. Crawling or Aggregating landing pages

4. Each retrieved sub-landing page is corresponding semantically to an AdGroup. Select multiple AdGroups

   - For Profit Optimization, next to each sub-landing page the user can insert a specific monetary profit that he is going to gain from a conversion in this page

5. Confirm and select generated keywords

   - Next to each keyword it is presented to the user a normalized score of its relevance to the AdGroup, as well as an **initial bid value** [*min(1, estimatedFirstPageCPC)*]

6. Confirm or edit the generated ad-text

7. Upload to AdWords through its API

Experimental Evaluation on Keyword Generation

Keyword CTR Comparison for top-11 terms:
Using the exact same bidding strategy for two identical campaigns of a company that offers web developing solutions (a highly competitive field for online advertising)
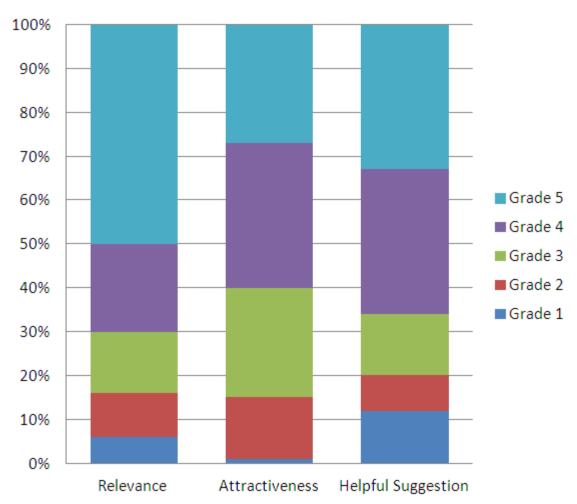

- More experiments can be found in *[K. Liakopoulos, S. Thomaidou, and M. Vazirgiannis, 2012]*

Experimental Evaluation on Ad Creative Generation

Eleven researchers and postgraduate students provided feedback regarding the automated generated ad-texts in the scale of
- Grade.1:Bad
- up to
- Grade.5:Very Good

Ad Creative Evaluation

Legend:
- Grade 5
- Grade 4
- Grade 3
- Grade 2
- Grade 1

X-axis categories: Relevance, Attractiveness, Helpful Suggestion
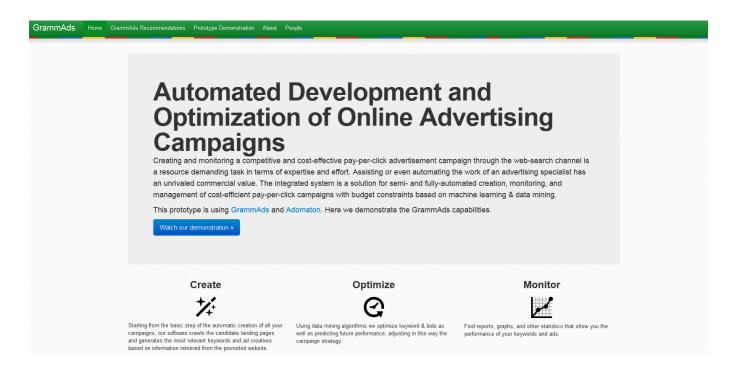
Future Work and Discussion

- **GrammAds Contributions: Improvement of the advertising campaign creation process**
  - Automated and fast way of uploading Campaign and AdGroup settings – Retrieval of several landing pages
  - Recommending multiword terms (n-grams) with high specificity. Enrichment of vocabulary through extra suggestions
  - Automated and fast generation of multiple ad creatives
  - A developed web application with initial experimentation on real world campaigns

- **Further System Expansion - Advanced Ad Creative Generation**
  - Improved Natural Language Generation (NLG) through Part-Of-Speech (POS)-Tagging of produced n-grams and proper combination of them
  - (Product) Named Entity Recognition – to ensure inclusion of product name
  - Sentiment analysis – examine ad text polarity - keep only positive sentences

- **Market Trends**
  - Advertising Text on Social Networks, e.g. text snippets as promoted tweets for Twitter
  - Corresponding placement for ads on mobile phones and tablets

Demos & Screencasts

You can find demonstrations and screencasts of the capabilities of our prototypes here:

www.grammads.com

www.adomaton.com

Selected References

- S. Ravi, A. Z. Broder, E. Gabrilovich, V. Josifovski, S. Pandey, B. Pang: Automatic generation of bid phrases for online advertising. WSDM 2010

- Evgeniy Gabrilovich: Ad Retrieval Systems in vitro and in vivo: Knowledge-Based Approaches to Computational Advertising. ECIR 2011

- I. Androutsopoulos, P. Malakasiotis: A Survey of Paraphrasing and Textual Entailment Methods. J. Artif. Intell. Res. (JAIR) 38 (2010)

- V. Abhishek, K. Hosanagar. Keyword generation for search engine advertising using semantic similarity between terms. In Proceedings of the ninth international conference on Electronic commerce (ICEC '07)

- A. Joshi, R. Motwani: Keyword Generation for Search Engine Advertising. ICDM Workshops 2006

- S. Thomaidou, K. Leymonis, K. Liakopoulos, M. Vazirgiannis: AD-MAD: Automated Development and Optimization of Online Advertising Campaigns. ICDM Workshops 2012

- K. Liakopoulos, S. Thomaidou, M. Vazirgiannis. The Adomaton Prototype: Automated Online Advertising Campaign Monitoring and Optimization. In Eighth Ad Auctions Workshop, EC'12

- Stamatina Thomaidou, Michalis Vazirgiannis: Multiword Keyword Recommendation System for Online Advertising. ASONAM 2011

Thank You