

GrammAds: Keyword and Ad Creative Generator for Online Advertising Campaigns

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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

The screenshot shows a Google search for "dishwashers". The search bar is at the top with the Google logo. Below the search bar, it says "Search" and "About 6,130,000 results (0.28 seconds)".

On the left side, there is a sidebar with navigation options: "Everything", "Images", "Maps", "Videos", "News", "Shopping", "More", "Boston, MA", "Change location", "Any time", "Past hour", "Past 24 hours", "Past 2 days", "Past week", "Past month", "Past year", "Custom range...", and "More search tools".

The main content area is divided into three sections:

- Organic Results:**
 - Dishwashers at Lowe's® | Lowe's.com**
www.lowes.com - ★★★★★ 82 seller reviews
Get Quality Dishwashers At Everyday Low Prices. Shop Lowe's® Today!
✦ Show map of 729 Bridge Street, Weymouth, MA and nearby lowes.com locations
 - Frigidaire® Dishwashers | Frigidaire.com**
www.frigidaire.com
Get a Quiet Performance Every Time with a Dishwasher from Frigidaire®.
 - Dishwashers at Sears® | Sears.com**
www.sears.com/Dishwashers
Save on Dishwashers and More at Sears. Official Site. Shop Now!
Buy More, Save More Sale - Up to 25% Off Kitchen Bundles - Hot Appliance Deals
- Sponsored Ads:**
 - GE GSD2100VBB Full Console Dishwasher with 12-**
\$279.65 - AJ Madison
 - Bosch Ascenta Series SHE3AR56UC**
\$349.00 - Elite Appliance
 - Top Brand Dishwasher Sale**
www.ajmadison.com/Authorized_Dealer
ajmadison.com is rated ★★★★★
Save Now! Price Match Guarantee On A Huge Selection of Dishwashers.
✦ Show products from AJ Madison
 - Dishwasher Ratings**
www.ask.com/Dishwasher+Ratings
Get Dishwasher Ratings
Search for Dishwasher Ratings
 - Bosch Dishwasher**
www.aaaappliancesales.com
Sales Service Install
Call For Special Pricing
 - Top 50 Dishwashers**
dishwasher.compare99.com
UpTo 70% Off Dishwashers
New Models Compare Dishwashers
- Shopping Results:**
 - Whirlpool DU1055XTVS - Built-in - 24"**
★★★★★ 38
\$300
Find nearby
 - Bosch Ascenta SHE3AR56UC Full Console**
★★★★★ 8
\$518
Find nearby
 - Classic Series 52 DBA (Per IEC Standards**
★★★★★ 8
\$851
Find nearby
 - Maytag MDB7749AWM Jetclean Plus**
★★★★★ 29
\$520
Find nearby
 - Bosch Ascenta SHE3AR56UC Full Console**
★★★★★ 25
\$450
Find nearby

- 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

- Extracts bid phrases from the HTML Document

Keyword Suggestion

- Suggests extra terms using Search Engine Snippets

Ad Creative Generation

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

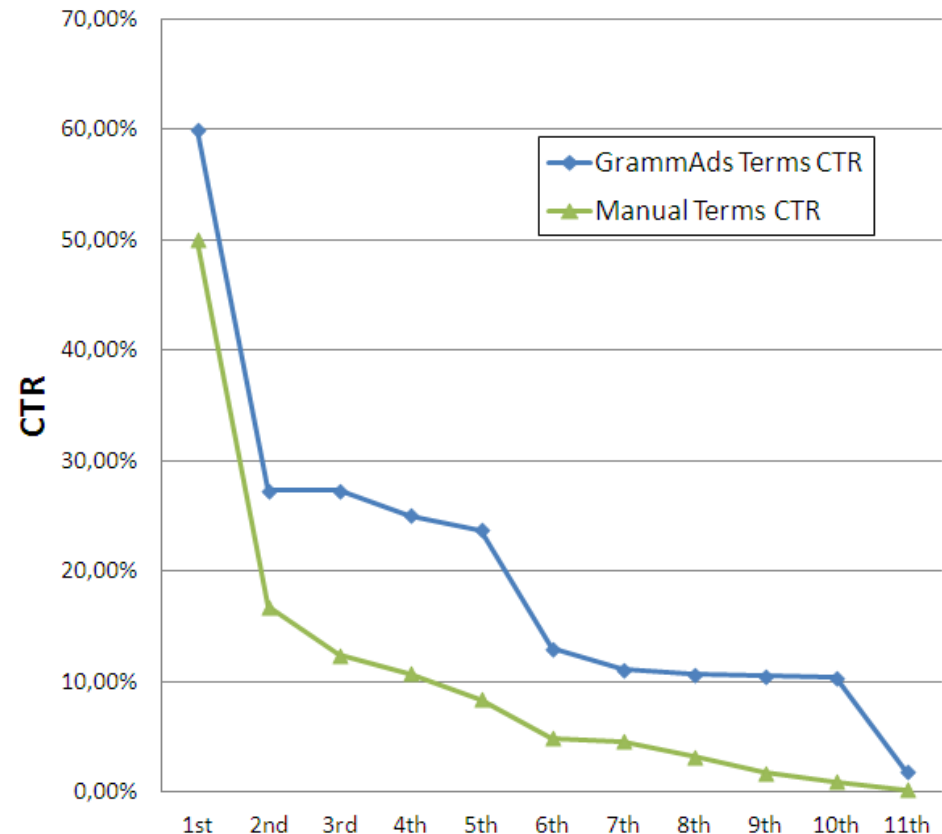
Campaign Organization: Description of Steps

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** [$\min(1, \text{estimatedFirstPageCPC})$]
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)

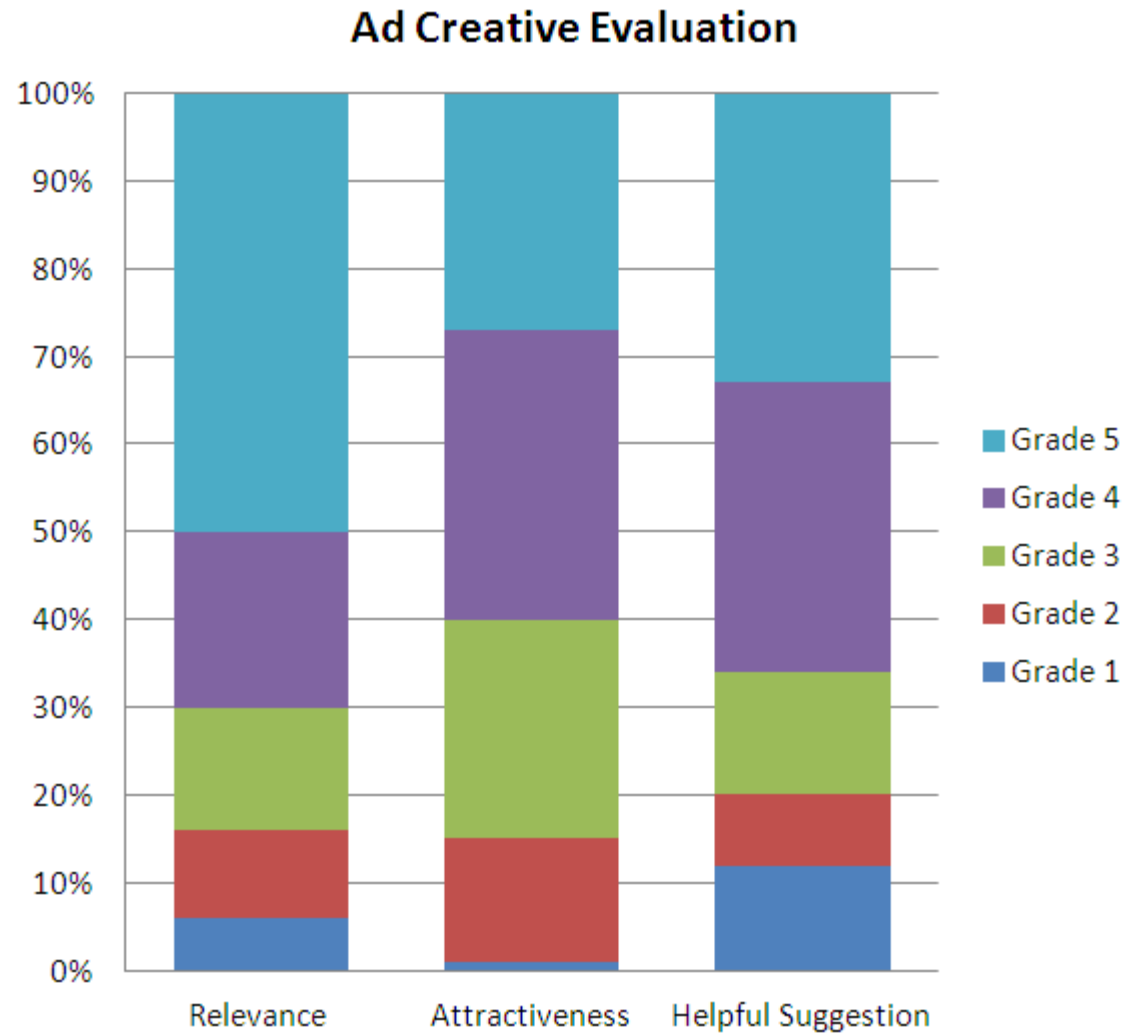


- More experiments can be found in *[K. Liakopoulos, S. Thomaidou, and M. Vazirgiannis, 2012]*

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



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 & Screenscasts

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

www.grammads.com

www.adomaton.com

The screenshot shows the GrammAds website with a green navigation bar containing links: GrammAds, Home, GrammAds Recommendations, Prototype Demonstration, About, and People. The main content area features a large heading 'Automated Development and Optimization of Online Advertising Campaigns'. Below the heading is a paragraph explaining the service: 'Creating and monitoring a competitive and cost-effective pay-per-click advertisement campaign through the web-search channel is a resource demanding task in terms of expertise and effort. Assisting or even automating the work of an advertising specialist has an unrivaled commercial value. The integrated system is a solution for semi- and fully-automated creation, monitoring, and management of cost-efficient pay-per-click campaigns with budget constraints based on machine learning & data mining.' This is followed by a sub-paragraph: 'This prototype is using GrammAds and Adomaton. Here we demonstrate the GrammAds capabilities.' and a blue button labeled 'Watch our demonstration >'. At the bottom, there are three columns: 'Create' with a star icon and text about automatic campaign creation; 'Optimize' with a circular arrow icon and text about data mining for keyword optimization; and 'Monitor' with a line graph icon and text about reporting and statistics.

GrammAds Home GrammAds Recommendations Prototype Demonstration About People


Automated Development and Optimization of Online Advertising Campaigns

Creating and monitoring a competitive and cost-effective pay-per-click advertisement campaign through the web-search channel is a resource demanding task in terms of expertise and effort. Assisting or even automating the work of an advertising specialist has an unrivaled commercial value. The integrated system is a solution for semi- and fully-automated creation, monitoring, and management of cost-efficient pay-per-click campaigns with budget constraints based on machine learning & data mining.

This prototype is using [GrammAds](#) and [Adomaton](#). Here we demonstrate the GrammAds capabilities.


[Watch our demonstration >](#)

Create




Starting from the basic step of the automatic creation of all your campaigns, our software crawls the candidate landing pages and generates the most relevant keywords and ad creatives based on information retrieved from the promoted website.

Optimize



Using data mining algorithms we optimize keyword & bids as well as predicting future performance, adjusting in this way the campaign strategy.

Monitor



Find reports, graphs, and other statistics that show you the performance of your keywords and ads.

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