Additional Details for Automated Experiments on Personalized Ad Settings

1 Selecting Test Statistics

AdFisher has the ability to pick a prediction model from a variety of text-book algorithms and parameters. For each learning algorithm, we have also listed out the corresponding parameter spaces from which AdFisher selects a model. In course of our studies, we found that L2 penalized logistic regression generally had low cross-validation scores.

Classifier	—— Parameters ——	
Logistic Regression	penalty $= \{L_1, L_2\}$	$C = \{2^{-5}, 2^{-4}, \ldots, 2^{15}\}$
k-Nearest-Neighbors Classifier	power parameter $= \{1, 2, 3\}$	$k = \{1, 3, \ldots, 19\}$
SVM with polynomial kernel	degree $= \{1, 2, 3, 4\}$	$C = \{2^{-5}, 2^{-4}, \ldots, 2^{15}\}$
SVM with Gaussian rbf kernel	$\gamma = \{2^{-15}, 2^{-14}, \ldots, 2^{3}\}$	$C = \{2^{-5}, 2^{-4}, \ldots, 2^{15}\}$

2 Experiments

In each of our experiments, we compared the effects of two treatments, each being applied to a group of agents (browser instances) in the experiment. Agents are randomly assigned to a group, each group comprising of half of all the agents. During the treatment phase, an agent can perform several actions. In its current implementation, AdFisher can drive the agents to visit a list of websites one after the other, or modify demographics (gender, age-group, and interests) on Google Ad Settings. A user can add the functionality to perform other actions to AdFisher.

After the application of treatments, each agent makes measurements. AdFisher has the functionality to record advertisements served by Google on five different news websites (`theguardian.com/us`, `timesofindia.indiatimes.com`, `bbc.com/news`, `reuters.com/news/us` and `bloomberg.com`), or demographics (gender, age-group, and interests) on Google Ad Settings for each agent.

2.1 Opacity

2.1.1 Table of Results

We ran each experiment for a 100 blocks, each block having 10 agents. That results in a total of 1000 agents, 500 in the experimental group and 500 in the control group. For each experiment, we counted the total number of ads served to agents in the experimental and control groups. The table also contains the value of the regularization parameter selected from cross-validation, times required for the training and testing a classifier, the prediction accuracy on the testing data, and the p value from the permutation test.

Treatments	# ads (# unique ads)			C	computation time		accuracy	p-value
	experimental	control	total		training	testing		
Substance Abuse	$20,420$ (427)	$22,204$ (530)	$42,624$ (673)	0.125	18s	3m19s	81%	5.298×10^{-6}
Disability	$19,787$ (546)	$23,349$ (684)	$43,136$ (954)	1.0	21s	3m18s	75%	5.298×10^{-6}
Mental Disorder	$22,303$ (407)	$22,257$ (465)	$44,560$ (600)	0.0625	31s	3m19s	59%	0.052965
Infertility	$22,438$ (605)	$22,544$ (625)	$44,982$ (856)	0.125	39s	3m23s	57%	0.113977
Adult Websites	$17,670$ (602)	$17,760$ (580)	$35,430$ (850)	128.0	33s	3m28s	52%	0.416935

2.1.2 Insight into the Substance Abuse Experiment

Here, we list the top five ads that appear on the control and experimental group. For each ad, we also record the number of appearances of each ad in the training and testing datasets. No interests were set in any agent in this experiment.

Top ads for identifying agents in the experimental group (visited websites associated with substance abuse)

Advertisement	Coefficient	appears in agents		total appearances	
		control	experimental	control	experimental
The Watershed Rehab ; `www.thewatershed.com/Help`; - Drug Alcohol Rehabilitation Call Today For Help Now!	-0.888	0	245	0	1990
		0	35	0	286
		0	280	0	2276
Watershed Rehab ; `www.thewatershed.com/Rehab`; - Get The Help You Deserve! Safe and Confidential. 24 hrs	-0.67	0	43	0	298
		0	8	0	64
		0	51	0	362
The Watershed Rehab ; Ads by Google ; Drug Alcohol Rehabilitation Call Today For Help Now!	-0.463	0	228	0	684
		0	30	0	87
		0	258	0	771
Veteran Home Loans ; `www.vamortgagecenter.com`; Qualifications Made Easier with VA Home Loan. Up To $417K w/ $0 Down.	-0.414	10	14	18	32
		3	1	4	1
		13	15	22	33
CAD Paper Rolls ; `paper-roll.net/Cad-Paper`; CAD Paper Rolls online. Best Price 18yrs of Quality	-0.405	0	4	0	21
		0	0	0	0
		0	4	0	21

Top ads for identifying agents in control group

Advertisement	Coefficient	appears in agents		total appearances	
		control	experimental	control	experimental
Alluria Alert ; `www.bestbeautybrand.com`; Do Not Try Alluria Until You Read The Facts About Alluria Now	0.489	2	0	9	0
		0	0	0	0
		2	0	9	0
Best Dividend Stocks ; `dividends.wyattresearch.com`; 5 Stocks That are Cash Machines for Retirement. New Free Stock Report.	0.431	19	9	53	23
		1	1	1	1
		20	10	54	24
10 Stocks to Hold Forever ; `www.streetauthority.com`; Buy them, forget about them, and never sell them.	0.428	51	44	118	76
		0	0	0	0
		51	44	118	76
Delivery Drivers Wanted ; `get.lyft.com/drive`; - Drive While Looking For Your Job Join Lyft and Make Up to $20/Hour!	0.362	21	6	50	14
		1	0	4	0
		22	6	54	14
VA Home Loans Start Here ; `www.vamortgagecenter.com`; - Have You Served? See if you Qualify For a $0 Down VA Home Loan.	0.354	20	6	36	9
		3	0	5	0
		23	6	41	9

2.1.3 Insight into the Disablities Experiment

Here, we list the top five ads that appear on the control and experimental group. For each ad, we also record the number of appearances of each ad in the training and testing datasets.

Top ads for identifying the experimental group (those that visited websites assocated with disabilities

Advertisement	Coefficient	appears in agents		total appearances	
		control	experimental	control	experimental
Mobility Lifter ; `www.abilitiesexpo.com`; Takes the Climb out of the Stairs. Learn more at Abilities Expo.	-1.543	0	74	0	513
		0	10	0	55
		0	84	0	568
Standing Wheelchairs ; `www.abilitiesexpo.com`; Learn about standing wheelchairs at the Abilities Expo Community.	-1.424	0	79	0	466
		0	9	0	42
		0	88	0	508
Smoking MN Healthcare ; `www.stillaproblem.com`; - Smoking cost MN nearly \$3 Billion in excess healthcare a year!	-1.415	0	23	0	59
		0	1	0	1
		0	24	0	60
Bike Prices ; `www.bikesdirect.com`; Choose From Our Wide Range Of Bikes Now. Free Shipping On All Orders!	-1.299	0	22	0	75
		0	2	0	4
		0	24	0	79
\$19 Car Insurance - New ; `auto-insurance.quotelab.com/MN`; - Get a Free Quote Save 55-75%! (Minnesota Residents Only)	-1.276	0	5	0	8
		0	1	0	1
		0	6	0	9

Top ads for identifying agents in the control group

Advertisement	Coefficient	appears in agents		total appearances	
		control	experimental	control	experimental
Beautiful Women in Kiev ; `anastasiadate.com`; Ukraine Women are Perfect Wives Marry One have Borsch Every Day!	1.304	171	30	480	73
		19	16	53	43
		190	46	533	116
Melucci DDS ; `AdsbyGoogle`; State of the Art Dentistry New Patients Welcome	1.255	4	2	10	6
		0	0	0	0
		4	2	10	6
17.2% 2013 Annuity Return ; `advisorworld.com/CompareAnnuities`; True Investor Returns with no Risk. Find out how with our Free Report.	1.189	29	5	45	6
		1	0	1	0
		30	5	46	6
3 Exercises To Never Do ; `homeworkoutrevolution.net`; These three exercises age you Learn a 4-minute replacement here	1.16	1	1	3	1
		0	0	0	0
		1	1	3	1
Find CNA Schools Near You ; `cna-degrees.courseadvisor.com`; - Train for a Career in Nursing. Earn a CNA Degree Online or on Campus!	1.05	22	0	49	0
		0	0	0	0
		22	0	49	0

2.2 Control I: Removing interests
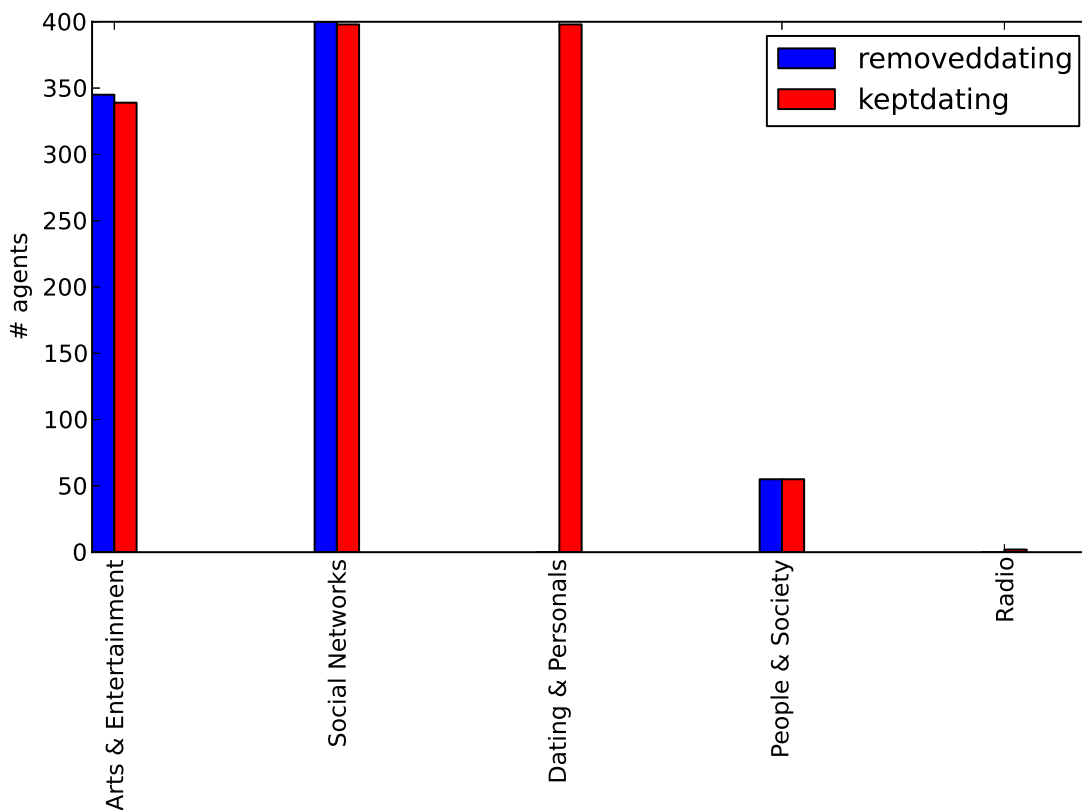
2.2.1 Table of Results

We ran each experiment for several blocks, each block having 10 agents. For each experiment, we counted the total number of ads served to agents in the experimental and control groups. The table also contains the value of the regularization parameter selected from cross-validation, times required for the training and testing a classifier, the prediction accuracy on the testing data, and the p value from the permutation test.

The website visited to induce an interest in dating was `midsummerseve.com`, while that for an interest in weight loss was `dietingsucks.blogspot.com`. Just a single visit to both these websites was enough to induce interests in Google Ad Settings.

| Experiment | blocks | # ads (# unique ads) | | | C | computation time | | accuracy | p-value |
		removed	kept	total		train	test		
Dating	100	$17,975$ (518)	$17,762$ (457)	$35,737$ (669)	0.5	13s	3m27s	74%	5.298×10^{-6}
Weight Loss	83	$15,826$ (367)	$15,449$ (427)	$31,275$ (548)	4.0	16s	3m4s	60%	0.040948

2.2.2 Interests in the Dating Experiment

The following figure shows the interests on the agents in each group in the Dating Experiment. None of the agents in the *removeddating* group had any interest with the keyword *dating*. No other interest was removed in the treatment phase.
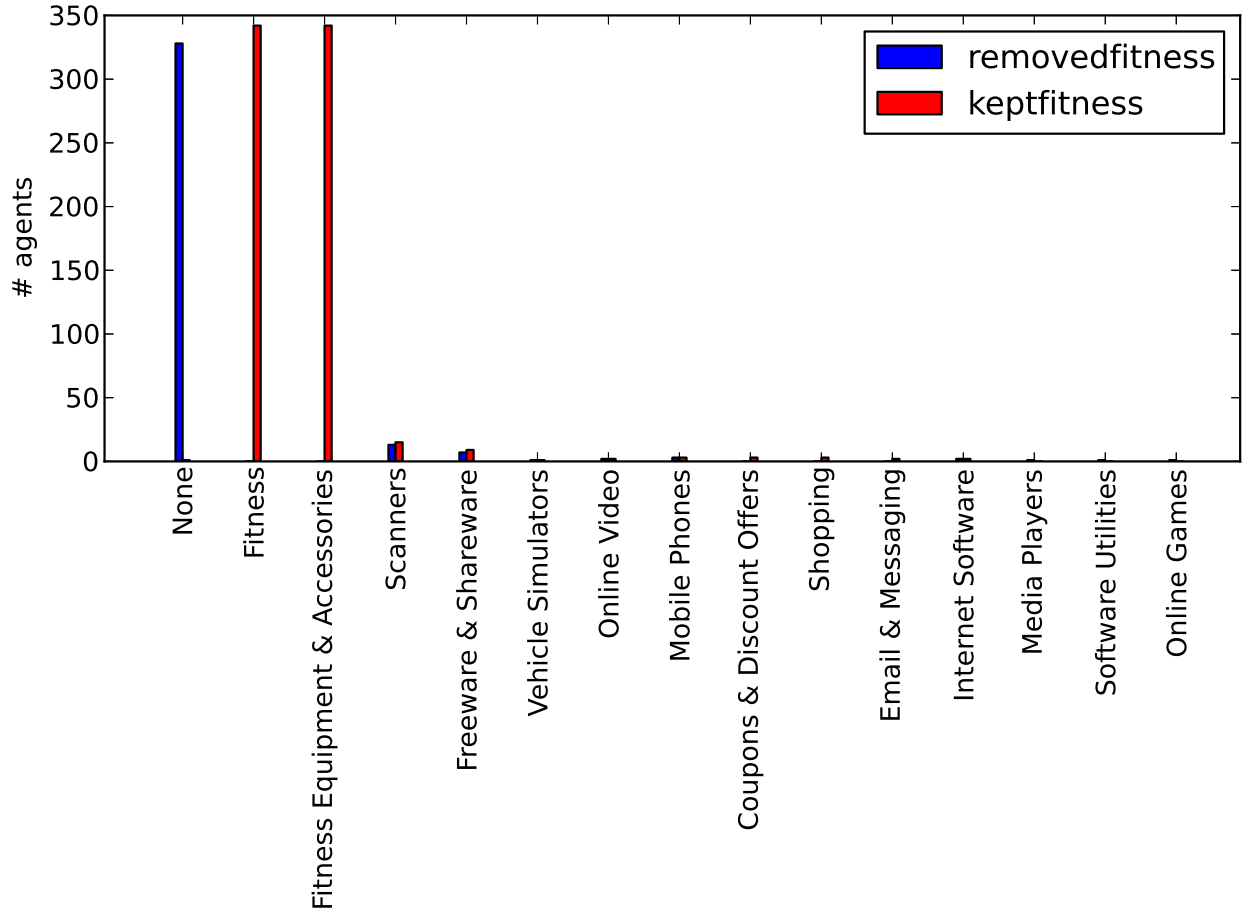
2.2.3 Insight into the Dating Experiment

Here, we list the top five ads that appear on the agents that kept the interest and the ones that removed. For each ad, we also record the number of appearances of each ad in the training and testing datasets.

Top ads for identifying the group that kept dating interests					
Advertisement	Coefficient	appears in agents		total appearances	
		kept	removed	kept	removed
Are You Single? ; `www.zoosk.com/Dating`; Meet a Real Date For Free on Zoosk Fastest Growing Site. Join Now!	1.583	341	30	2287	70
		26	3	146	8
		367	33	2433	78
Top 5 Online Dating Sites ; `www.consumer-rankings.com/Dating`; - Our Top 5 Online Dating Picks. Read Our Reviews Sign Up Free!	1.109	112	9	394	12
		4	1	14	1
		116	10	408	13
Why can't I find a date? ; `www.gk2gk.com`; Maybe because you're looking in the wrong places. Try Geek 2 Geek	0.935	18	3	51	5
		0	0	0	0
		18	3	51	5
Latest Breaking News ; `www.onlineinsider.com`; Get Breaking News, Headlines Top Stories With The Free News Toolbar	0.624	2	1	6	1
		0	0	0	0
		2	1	6	1
Gorgeous Russian Ladies ; `anastasiadate.com`; - 24,000 Single Russian Ladies Register free, free hello notes!	0.62	10	0	19	0
		1	0	2	0
		11	0	21	0

Top ads for identifying agents in the group that removed dating interests					
Advertisement	Coefficient	appears in agents		total appearances	
		kept	removed	kept	removed
Car Loans w/ Bad Credit ; `www.car.com/Bad-Credit-Car-Loan`; - 100% Acceptance! $1500/Month Income Pre-Qualifies $7K-$25K Apply Here	-1.113	5	13	8	37
		0	0	0	0
		5	13	8	37
Individual Health Plans ; `www.individualhealthquotes.com`; - Get Free Health Insurance Quotes! Compare Your Options Now.	-0.831	7	9	21	46
		0	0	0	0
		7	9	21	46
Crazy New Obama Tax ; `www.endofamerica.com`; Obama's new currency law goes into effect in less than 90 days.	-0.722	19	28	22	44
		0	3	0	7
		19	31	22	51
Atrial Fibrillation Guide ; `www.johnshopkinshealthalerts.com`; New Information You Need To Know From One Of America's Top Hospitals	-0.641	0	6	0	25
		0	0	0	0
		0	6	0	25
Free $5 - $25 Gift Cards ; `swagbucks.com`; Free Gift Cards for Taking Surveys, Watching Videos, Games More!	-0.614	3	11	4	32
		1	0	1	0
		4	11	5	32

2.2.4 Interests in the Weight Loss Experiment

The following figure shows the interests on the agents in each group in the Weight Loss Experiment. None of the agents in the *removedfitness* group had any interest with the keyword *fitness*. No other interest was removed in the treatment phase. Notice that more that 300 agents in the group *removedfitness* did not have any interests set. This implies that these agents only had interests which had the keyword *fitness* after visiting websites related to weight loss.

2.2.5 Insight into the Weight Loss Experiment

Here, we list the top five ads that appear on the agents that kept the interest and ones that removed. For each ad, we also record the number of appearances of each ad in the training and testing datasets.

Top ads for identifying the group that kept fitness interests					
Advertisement	Coefficient	appears in agents		total appearances	
		kept	removed	kept	removed
2 Weight Loss Ingredients ; `www.slimscience.com`; Do-it-yourself weight loss with these 2 shocking ingredients	3.437	11	0	11	0
		6	0	6	0
		17	0	17	0
Boost Your Metabolism ; `buynutridiet.com/Dietary-Supplement`; Try Our Natural Diet Supplements. Get Your Free NutriDiet Coupon Now!	2.78	4	0	7	0
		1	1	2	1
		5	1	9	1
Weight Loss for Ages 45+? ; `www.slimscience.com`; Do-it-yourself weight loss with these 2 shocking ingredients	2.463	8	0	8	0
		2	0	2	0
		10	0	10	0
SHRM LS Online Course ; `campusce.net/SHRM-LS-Online`; CSU's PHR/SPHR Cert. Online Course Covers All You Need For Exam Prep.	2.223	2	0	3	0
		0	0	0	0
		2	0	3	0
Weight Loss Pittsburgh ; `idealwellnesspittsburgh.com/LoseFat`; Lose Weight Keep it Off. Pittsburgh's #1 Choice for Fat Loss	1.945	5	1	13	1
		0	0	0	0
		5	1	13	1

Top ads for identifying agents in the group that removed fitness interests					
Advertisement	Coefficient	appears in agents		total appearances	
		kept	removed	kept	removed
I Had High Blood Pressure ; `www.resperate.com`; Now it's down to 120/75. Find out how I did it With Breathing. Try It	-3.218	1	4	1	11
		1	0	1	0
		2	4	2	11
Reverse Gray Hair ; `www.nograyhairs.com`; - Learn How Catalase Can Make You Look Years Younger In Weeks	-1.954	0	1	0	1
		0	0	0	0
		0	1	0	1
Badminton Racket ; `www.badmintonavenue.com`; - Badminton Mega Superstore Free Shipping on Orders over $100	-1.866	2	8	3	12
		0	0	0	0
		2	8	3	12
Old Newspaper Archives ; `www.archives.com`; Extensive Database of Images, Vital Records, Newspapers More!	-1.718	0	1	0	1
		0	0	0	0
		0	1	0	1
Sell Your Luxury Watches ; `www.bullock.com`; Bullock Buys Pre-Owned Watches. See How Much Your Watch Is Worth.	-1.607	0	1	0	2
		0	0	0	0
		0	1	0	2

2.3 Control II: Opt-out

We carried out four different experiments to study the effects of opting out on Google Ad Settings. Note that it is not possible to opt-out without first opting in to behavioral advertisements across the web. In each, we compared two treatments. Each treatment is a sequence of actions performed on the agent. 5 websites related to *vehicle shopping* were visited as part of the treatment: `passwordjdm.com`, `automall.com`, `australianmusclecarsales.com.au`, `autosearcher.com`, and `prostreetonline.com`.

Experiment	Treatment 1	Treatment 2
A	[Opt In → Opt Out]	[Opt In → Visit Websites −> Opt Out]
B	[Opt In → Visit Websites]	[Opt In → Visit Websites −> Opt Out]
C	[Opt In → Visit Websites]	[Opt In → Opt Out −> Visit Websites]
D	[Opt In → Visit Websites −> Opt Out]	[Opt In → Opt Out −> Visit Websites]

2.3.1 Table of Results

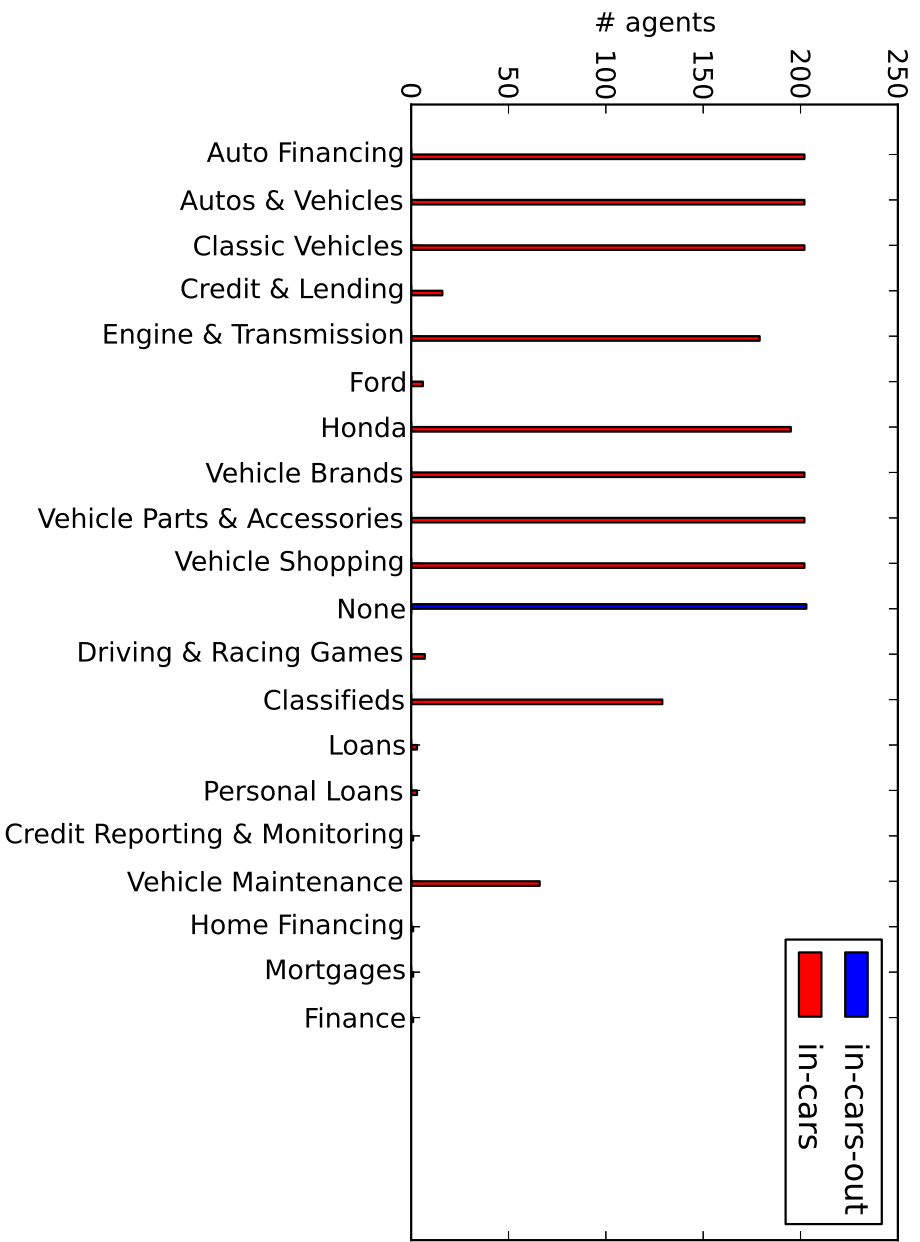We present results from each of these four experiments in the following table For each experiment, we counted the total number of ads served to agents in the experimental and control groups. The table also contains the value of the regularization parameter selected from cross-validation, times required for the training and testing a classifier, the prediction accuracy on the testing data, and the p value from the permutation test.

In Experiments A and D, agents from both the treatments opted out of behavioral advertising. However, in Experiments B and C, agents from one of the treatments opted out, while the others did not. In the latter two experiments, the differences are significant. This shows that visiting the websites affects the ads when the agents did not opt out. However, if both the groups opted out, like in Experiments A and D, then this difference vanishes. This shows that Google is respecting opt-out preferences on Google Ad Settings.

Experiment	blocks	# ads (# unique ads)			C	computation time		accuracy	p-value
		removed	kept	total		train	test		
A	100	$14,399$ (192)	$14,392$ (199)	$28,791$ (250)	0.0625	9s	3m28s	48%	0.753168
B	54	$9,056$ (293)	$9,029$ (139)	$18,085$ (366)	0.0625	4s	2m10s	83.3%	5.298×10^{-6}
C	100	$4,399$ (234)	$4,881$ (138)	$9,280$ (323)	0.0625	6s	3m30s	70%	5.298×10^{-6}
D	83	$15,971$ (241)	$15,773$ (238)	$31,744$ (303)	0.125	10s	3m6s	54.4%	0.259837

2.3.2 Interests in the Opt-Out Experiment B

The following figure shows the interests on the agents in each group in the experiment. Note that none of the agents that opted out have any induced interest: there are no blue bars other than on *None*.
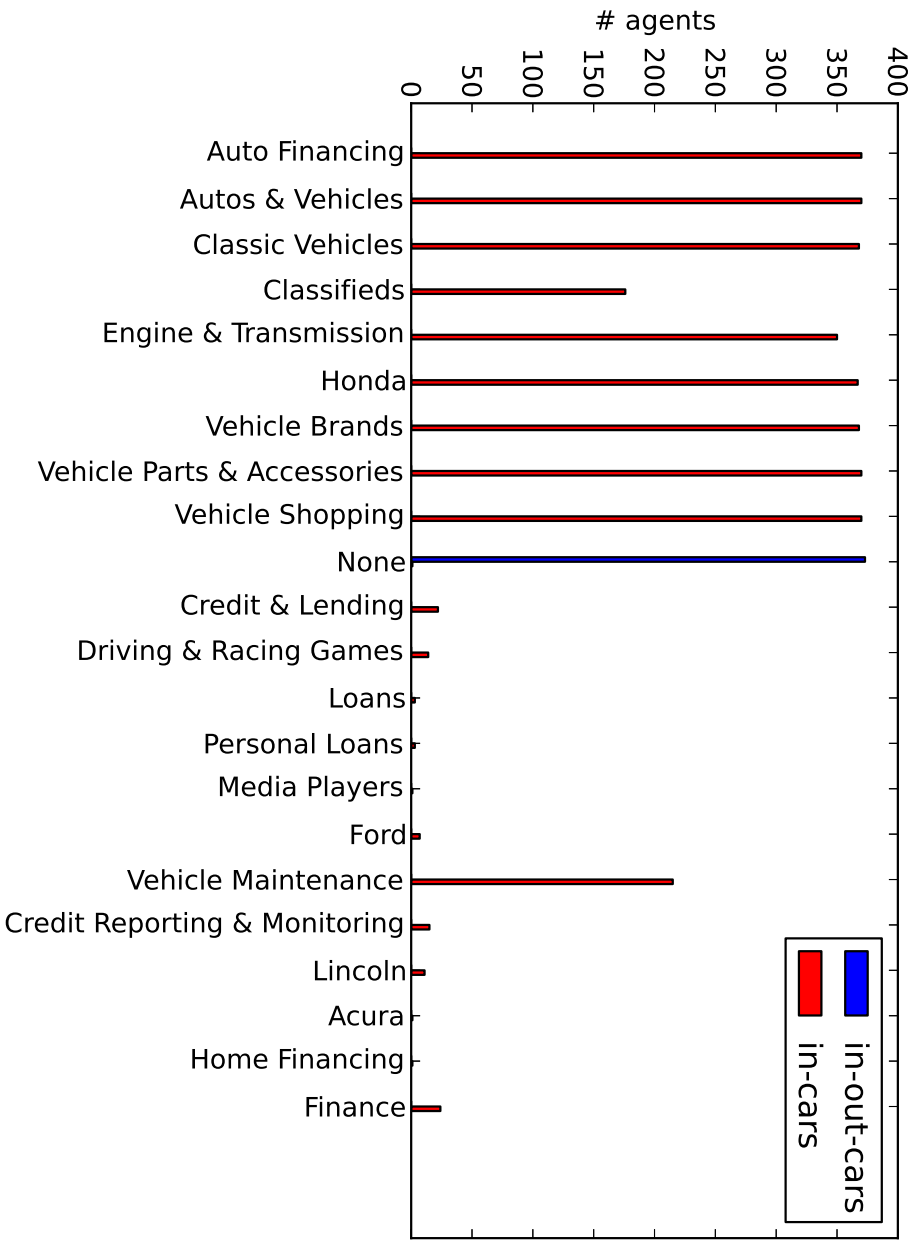
2.3.3 Insight into the Opt-Out Experiment B

Here, we list the top five ads that appear on the agents that opted out and ones that did not. For each ad, we also record the number of appearances of each ad in the training and testing datasets.

Top ads for identifying agents undergoing treatment 1					
Advertisement	Coefficient	appears in agents		total appearances	
		treat1	treat2	treat1	treat2
2013 Honda Car Clearance ; `honda-clearance-sale.autosite.com`; Massive Honda Price Cuts this Month See Our Honda Car Discounts Save	0.395	119	0	850	0
		10	0	78	0
		129	0	928	0
Car Loans w/ Bad Credit ; `www.car.com/Bad-Credit-Car-Loan`; 100% Acceptance! $1500/Month Income Pre-Qualifies $7K-$25K Apply Here	0.348	110	0	437	0
		7	0	28	0
		117	0	465	0
Honda Civic Clearance ; `www.honda.car.com`; Massive Discounts On '13 Honda! Get Your Honda Internet Pricing	0.248	53	0	465	0
		4	0	36	0
		57	0	501	0
Tower Auto / Used Autos ; `www.towerautosales.com`; - Featuring upscale off lease imports 40 years same location, JUST BUY IT	0.226	72	0	289	0
		0	0	0	0
		72	0	289	0
Beautiful Women in Kiev ; `anastasiadate.com`; - Ukraine Women are Perfect Wives Marry One have Borsch Every Day!	0.21	108	0	241	0
		15	0	31	0
		123	0	272	0

Top ads for identifying agents undergoing treatment 2					
Advertisement	Coefficient	appears in agents		total appearances	
		treat1	treat2	treat1	treat2
10 Stocks to Hold Forever ; `www.streetauthority.com`; Buy them, forget about them, and never sell them.	-0.271	4	166	11	888
		0	0	0	0
		4	166	11	888
New Nissans From $11,990 ; `reply.com/Nissan`; Dealers Are Slashing Prices! Everything Must Go.	-0.202	15	151	50	436
		3	15	11	36
		18	166	61	472
Stream the web to your TV ; `google.com/Chromecast`; wirelessly with Google Chromecast! Get yours for only $35.	-0.198	13	161	38	519
		0	8	0	14
		13	169	38	533
0% APR Credit Card Offers ; `www.creditcards.com`; 0% APR Credit Cards, No Annual Fee. Compare Offers Apply Online Now!	-0.196	17	122	28	377
		8	20	18	219
		25	142	46	596
Google Chromecast for $35 ; `google.com/Chromecast`; Enjoy online video anything from the web on your TV. buy now!	-0.13	146	173	1196	3328
		0	14	0	119
		146	187	1196	3447

The following figure shows the interests on the agents in each group in the experiment. Note that none of the agents that opted out have any induced interest: there are no blue bars other than on *None*.

2.3.5 Insight into the Opt-Out Experiment C

Here, we list the top five ads that appear on the agents that opted out and ones that did not. For each ad, we also record the number of appearances of each ad in the training and testing datasets.

Top ads for identifying agents undergoing treatment 1

Advertisement	Coefficient	appears in agents		total appearances	
		treat1	treat2	treat1	treat2
2013 Honda Car Clearance ; `honda-clearance-sale.autosite.com`; Massive Honda Price Cuts this Month See Our Honda Car Discounts Save	0.345	49	0	302	0
		11	0	85	0
		60	0	387	0
Car Loans w/ Bad Credit ; `www.car.com/Bad-Credit-Car-Loan`; 100% Acceptance! $1500/Month Income Pre-Qualifies $7K-$25K Apply Here	0.302	35	0	127	0
		7	0	21	0
		42	0	148	0
Used Cars From $1000 ; `autolist.com/UsedCars`; Search From 2.3 Million Cars. Compare and Get the Best Deal Now!	0.241	23	0	137	0
		9	0	58	0
		32	0	195	0
Beautiful Women in Kiev ; `anastasiadate.com`; - Ukraine Women are Perfect Wives Marry One have Borsch Every Day!	0.208	36	0	97	0
		3	0	6	0
		39	0	103	0
Honda Civic Clearance ; `www.honda.car.com`; Massive Discounts On '13 Honda! Get Your Honda Internet Pricing	0.199	23	0	205	0
		9	0	89	0
		32	0	294	0

Top ads for identifying agents undergoing treatment 2

Advertisement	Coefficient	appears in agents		total appearances	
		treat1	treat2	treat1	treat2
Stream the web to your TV ; `google.com/Chromecast`; wirelessly with Google Chromecast! Get yours for only $35.	-0.272	4	83	8	255
		3	17	3	111
		7	100	11	366
ITT Tech - Official Site ; `www.itt-tech.edu`; Associate, Bachelor Degree Programs Browse Programs Now Learn More.	-0.166	3	41	8	172
		0	3	0	4
		3	44	8	176
10 Stocks to Hold Forever ; `www.streetauthority.com`; Buy them, forget about them, and never sell them.	-0.164	2	39	2	238
		0	0	0	0
		2	39	2	238
Google Chromecast for $35 ; `google.com/Chromecast`; Enjoy online video anything from the web on your TV. buy now!	-0.158	59	94	494	1699
		14	20	113	295
		73	114	607	1994
0% APR Credit Card Offers ; `www.creditcards.com`; 0% APR Credit Cards, No Annual Fee. Compare Offers Apply Online Now!	-0.145	4	55	10	137
		0	4	0	4
		4	59	10	141

2.4 Discrimination

We ran two sets of experiments to peer into the aspect of discrimination. For each experiment, we counted the total number of ads served to agents in the experimental and control groups. The table also contains the value of the regularization parameter selected from cross-validation, times required for the training and testing a classifier, the prediction accuracy on the testing data, and the p value from the permutation test.

First, we observed how gender affects advertisements when the agents simulate job seeking behavior. We found that gender by itself does not yield significant differences in advertisements, however, if the agents also visit websites for employment, then the difference becomes significant.

| Experiment | blocks | #ads (# unique ads) | | | C | computation times | | accuracy | p-value |
		male group	female group	total		training	testing		
Gender	100	$20,263$ (630)	$20,137$ (603)	$40,400$ (843)	8.0	25s	3m22s	48%	0.771420
GenderJobs	100	$21,627$ (533)	$21,766$ (545)	$43,393$ (736)	0.03125	24s	3m15s	93%	5.298×10^{-6}

Next, we observed how setting the age group affects advertisements when the agents simulate job seeking behavior. We found that age group by itself yields significant differences in advertisements, however, this goes away when the agents visit websites about jobs.

| Experiment | blocks | #ads (# unique ads) | | | C | computation times | | accuracy | p-value |
		18-24	65+	total		training	testing		
Age	80	$17,368$ (584)	$16,849$ (524)	$34,217$ (787)	0.125	14s	2m51s	76.2%	5.298×10^{-6}
AgeJobs	54	$11,438$ (381)	$10,663$ (392)	$22,101$ (551)	0.125	7s	2m9s	56.7%	0.177738

2.4.1 Insight into the GenderJobs Experiment

Here, we list the top five ads that appear on the male and female treatments. For each ad, we also record the number of appearances of each ad in the training and testing datasets.

Top ads for identifying the simulated male group					
Advertisement	Coefficient	appears in agents		total appearances	
		in female	in male	in female	in male
$200k+ Jobs - Execs Only ; `careerchange.com`; Fee-Based Career Coaching. Take the Next Step - Submit Resume!	-0.704	55	356	281	1578
		5	46	30	238
		60	402	311	1816
Find Next $200k+ Job ; `careerchange.com`; Professional Career Coaching. Take the Next Step - Submit Resume!	-0.262	2	11	7	36
		0	0	0	0
		2	11	7	36
Become a Youth Counselor ; `www.youthcounseling.degreeleap.com`; Become a Youth Counselor. Compare Youth Counseling Programs Now.	-0.253	0	36	0	234
		0	9	0	76
		0	45	0	310
CDL-A OTR Trucking Jobs ; `www.tadrivers.com/OTRJobs`; - Great Miles, Excellent Equip., Pay For Performance. Apply Online Now!	-0.149	0	1	0	8
		0	0	0	0
		0	1	0	8
Free Resume Templates ; `resume-templates.resume-now.com`; - America's #1 Resume Templates. Build A Perfect Resume. Free!	-0.149	2	1	5	10
		1	0	3	0
		3	1	8	10

Top ads for identifying the simulated female group					
Advertisement	Coefficient	appears in agents		total appearances	
		in female	in male	in female	in male
Jobs (Hiring Now) ; `www.jobsinyourarea.co`; 892 Jobs Available In Your Area. Earn $8 - $65 per Hour. Hiring Now!	0.34	6	3	45	8
		0	0	0	0
		6	3	45	8
4Runner Parts Service ; `www.westernpatoyotaservice.com`; - Your Local Toyota Dealer has Great Dealers for You!	0.281	6	2	36	5
		0	0	0	0
		6	2	36	5
Criminal Justice Program ; `www3.mc3.edu/Criminal+Justice`; - Learn from Experienced Individuals. Get a Free Brochure for More Info!	0.247	5	1	29	1
		0	0	0	0
		5	1	29	1
Goodwill - Hiring ; `goodwill.careerboutique.com`; Now Hiring - Submit an Application. Browse Full Part Time Positions.	0.22	38	11	92	26
		7	4	29	13
		45	15	121	39
UMUC Cyber Training ; `www.umuc.edu/cybersecuritytraining`; Earn a cyber degree from UMUC. Programs offered entirely online.	0.199	19	17	38	30
		0	0	0	0
		19	17	38	30

2.4.2 Insight into the Age Experiment

Here, we list the top five ads that appear on the agents with different age groups. For each ad, we also record the number of appearances of each ad in the training and testing datasets. No interests were set in any agent in this experiment.

Top ads for identifying the simulated 18-24 group					
Advertisement	Coefficient	appears in agents		total appearances	
		in 18-24	in 65+	in 18-24	in 65+
Apply for Any Credit Card ; `www.cardhub.com`; All Credit Types, 0% Offers, VISA, MasterCard, etc. Compare Apply!	0.71	49	0	86	0
		4	0	10	0
		53	0	96	0
Badminton Warehouse ; `www.badmintonwarehouse.com`; Badminton Racquet Warehouse Victor, Yonex, Carlton, Pro-Tech.	0.613	113	16	263	30
		11	1	35	1
		124	17	298	31
Win 50 Silver Eagle Coins ; `independentlivingbullion.com`; Enter Now to Win 50 1-oz Coins Worth Over $1,250 in Pure Silver!	0.384	14	8	42	11
		2	3	3	9
		16	11	45	20
ITT Tech - Official Site ; `www.itt-tech.edu`; Tech-Oriented Degree Programs. Education for the Future.	0.375	15	0	70	0
		5	0	31	0
		20	0	101	0
2014 brings India- Change ; `kotak.com/NRI-Account`; Time to change your Bank A/c too. Highest Returns Bank A/c for NRIs.	0.372	52	25	166	48
		0	0	0	0
		52	25	166	48

Top ads for identifying the simulated 65+ group					
Advertisement	Coefficient	appears in agents		total appearances	
		in 18-24	in 65+	in 18-24	in 65+
10 Stocks to Hold Forever ; `www.streetauthority.com`; Buy them, forget about them, and never sell them.	-1.24	0	92	0	249
		0	0	0	0
		0	92	0	249
Only for NRI's - Gurgaon ; `dlfpropertygurgaon.co.uk/investment`; - Buy Prime Location Property India Direct Contract, Brokers Excuse	-0.944	0	62	0	108
		0	0	0	0
		0	62	0	108
Heart Attack Signs? ; `www.simplehearttest.com`; Know the 4 Bodily Signs. Take The Simple Heart Test Now	-0.817	9	75	11	103
		2	9	2	18
		11	84	13	121
Ellen Degeneres Lied? ; `skincareadvisors.org/ellen-secret`; Ellen's Secret Exposed. Fans around the world stunned.	-0.639	0	53	0	103
		0	3	0	11
		0	56	0	114
Best Canadian Dividends ; `wealthyretirement.com/Canada`; - 5 Canadian dividend stocks to give your portfolio an income boost.	-0.446	5	23	7	40
		3	5	5	8
		8	28	12	48