

# Appendix to: *Learning Disentangled Representations of Texts with Application to Biomedical Abstracts*

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## A Example of PICO Triplet generation

As an illustrative example, we walk through construction of a single triplet for the PICO domain in detail. Recall that we first randomly draw two reviews,  $R_1$  and  $R_2$ . In this case,  $R_1$  consists of studies involving nocturnal enuresis and review  $R_2$  concerns asthma. From  $R_1$  we randomly select two studies  $S, S'$ .

(1) Here we sample abstract  $A$  for study  $S$ , shown below:

In recent years the treatment of primary nocturnal enuresis (PNE) with desmopressin (DDAVP) has been promising. The route of administration until now had been intranasal, but because the tablets were introduced for the treatment of diabetes insipidus they have also become available for the treatment of PNE. To find the optimal dosage of desmopressin tablets and to compare desmopressin's efficacy with placebo in a group of adolescents with severe monosymptomatic enuresis. The long-term safety of desmopressin was also studied in the same group of patients. The effect of oral desmopressin (1-deamino-8-D-arginine-vasopressin) (DDAVP tablets, Minirin) was investigated in 25 adolescents (ages 11 to 21 years) with severe monosymptomatic nocturnal enuresis. The first part of the dose-ranging study comprised a single-blind dose titration period, followed by a double-blind, crossover efficacy period comparing desmopressin with placebo. The final part was an open long-term study consisting of two 12-week treatment periods. The efficacy of the drug was measured in reductions of the number of wet nights per week. During the first dose-titration period, the majority of the patients were given desmopressin 400 micrograms, and the number of wet nights decreased from a mean of 4.9 to 2.8. During the double-blind period, a significant reduction of wet nights was observed (1.8 vs 4.1 for placebo). During the two long-term periods, 48% and 53% of the patients could be classified as responders (0 to 1 wet night per week) and 22% and 23.5% as intermediate responders (2 to 3 wet nights per week). No weight gain was observed due to water retention. After cessation of the drug, 44% of the patients had a significant decrease in the number of wet nights. Oral desmopressin has a clinically significant effect on patients with PNE, and therapy is

safe when administered as long-term treatment.

For study  $S$ , the summaries in the CDSR are as follow. First the P summary ( $s_P$ ),

Number of children: 10 Inclusion criteria: adolescents (puberty stage at least 2, at least 12 years) Exclusion criteria: treatment in previous 2 weeks, daytime wetting, UTI, urinary tract abnormalities Previous treatment: failed using alarms, desmopressin, other drugs Age range 11-21, median 13 years Baseline wetting 4.7 (SD 1.1) wet nights/week Department of Paediatric Surgery, Sweden

I Summary ( $s_I$ ):

A : desmopressin orally (dosage based on titration period) B : placebo Duration 4 weeks each

The O summary ( $s_O$ )

Wet nights during trial (number, mean, SD): A: 10, 1.8 (SD 1.4); B: 10, 4.1 (1.5) Side effects: headache (5); abdominal pain (6); nausea and vertigo (1) All resolved while treatment continued

(2) From study  $S'$ , the summaries in the CDSR are reproduced as follows. First, the P Summary ( $s'_P$ ):

Number of children: 135 Dropouts: 23 excluded for non-compliance, and 39 lost to follow up including 12 failed with alarms Inclusion criteria: monosymptomatic nocturnal enuresis, age > 5 years Exclusion criteria: previous treatment with DDAVP or alarm, urological pathology, diurnal enuresis, UTI Age, mean years: 11.2 Baseline wetting: A 21% dry nights, B 14% dry nights

I Summary ( $s'_I$ ):

A (62): desmopressin 20 g intranasally increasing to 40 g if response partial B (73): alarm (pad-and-bell) Duration of treatment 3 months. If failed at that time, changed to alternative arm

The O summary ( $s'_O$ )

DRY nights at 3 months: A 85%; B: 90% Number not achieving 14 dry nights: A 12/39; B: 6/37 Side effects: not mentioned

(3) From review  $R_2$ , we sample one study  $S''$ . Matched summaries in the CDSR are as follows. P Summary ( $s''_P$ ):

n = 8 Mean age = 52 Inclusion: intrinsic asthma, constant reversibility > 20% None had an acute exacerbation at time of study Exclusion: none listed

I summary ( $s''_I$ ):

#1: Atenolol 100 mg Metoprolol 100 mg Placebo  
#2: Terbutaline (IV then inhaled) after Tx or placebo

O summary ( $s''_O$ ):

FEV1 Symptoms

(4) We note how the summaries for  $S$  and  $S'$  are similar to each other (but not identical) since they belong in the same review whereas they are quite different from summaries for  $S''$  which belongs in a different review. Now we construct the triplet  $(s, d, o)_P$  as follows:

$s = s'_P$ :

Number of children: 135 Dropouts: 23 excluded for non-compliance, and 39 lost to follow up including 12 failed with alarms Inclusion criteria: monosymptomatic nocturnal enuresis, age > 5 years Exclusion criteria: previous treatment with DDAVP or alarm, urological pathology, diurnal enuresis, UTI Age, mean years: 11.2 Baseline wetting: A 21% dry nights, B 14% dry nights

So we have  $d : A$  and  $o = [s''_P | s'_I | s'_O]$ :

n = 8 Mean age = 52 Inclusion: intrinsic asthma, constant reversibility > 20% None had an acute exacerbation at time of study Exclusion: none listed — A (62): desmopressin 20 g intranasally increasing to 40 g if response partial B (73): alarm (pad-and-bell) Duration of treatment 3 months. If failed at that time, changed to alternative arm — DRY nights at 3 months: A 85%; B: 90% Number not achieving 14 dry nights: A 12/39; B: 6/37 Side effects: not mentioned

## B Implementation Details & Baseline Hyperparameters

All tokenisation has been done using default spaCy<sup>1</sup> tokenizer.

<sup>1</sup><https://spacy.io/>

## B.1 PICO Domain

### B.1.1 Baselines

For the TF-IDF baseline, we use the implementation in scikit-learn<sup>2</sup>. The TF-IDF was fit on all CDSR data. The resulting transformation was applied to Cohen corpus. We use cosine similarity to evaluate TF-IDF model.

For Doc2Vec, we used the gensim implementation<sup>3</sup> with an 800d embedding size, and a window size of 10. These parameters were selected via random search over validation data. We otherwise used the default settings in gensim. The vocabulary used was the same as above.

For LDA, we again used the scikit-learn implementation, setting the number of topics to 7; this was selected via line search over the validation set across the range 1 to 50.

For the NVDM baseline, we used hidden layer comprising 500 dimensions and an output embedding dimension of 200. We used Tanh activation functions. The model was trained using the Adam optimizer, using a learning rate of 5e-5. We performed early stopping based on validation perplexity.

For the ABAE model, we use the same hyperparameters as reported in the original He *et al.* (2017) paper. We experimented with 20, 50 and 100 aspects. Of these, 100 performed best, which is what we used to generate the reported results.

For the DSSM model, we used 300d filters with filter windows of sizes (1, 6) and output embedding dimension of 256. We used tanh activation for both the convolution and output layers, and imposed l2 regularization on weights ( $1e-5$ ). The model was trained using the Adam optimizer with early stopping on validation loss.

## B.2 Beer Advocate Domain

### B.2.1 Baselines

For the TF-IDF baseline, we used the scikit-learn implementation. TF-IDF parameters were fit on the available training set. We used cosine similarity for evaluation.

For Doc2Vec, we used the same method as above, here setting (after line search) the embedding size to 800d and window size to 7.

For the LDA baseline, we followed the same strategy as above, arriving at 4 topics.

<sup>2</sup><http://scikit-learn.org/>

<sup>3</sup><https://radimrehurek.com/gensim/>

For NVDM, we set the number of dimensions in the hidden layer to 500, and set the embedding dimension to 145. As an activation for the hidden layer we used Tanh. Again the model was trained using the Adam optimizer, with a learning rate of  $5e-5$  and early stopping based on validation perplexity.

For the ABAE baseline, we use the same hyperparameters as in He *et al.* (2017) paper, since BeerAdvocate was one of the evaluation datasets used in said work.

For NVDM + Triplet Loss, we used same settings as reported above for NVDM, with loss weighting of 0.001.

For the DSSM baseline, we used 200d filters with filter windows of sizes (2, 4) and output embedding dimension of 256. We used tanh activations for both convolution and output layer and l2 regularization on weights of  $1e-6$ . The model was trained using Adam optimizer with early stopping on validation loss.

### B.3 Yelp! and TripAdvisor Domain

#### B.3.1 Baselines

To induce the baseline TF-IDF vectors, we used the scikit-learn implementation. TF-IDF parameters were fit on the available training set. Our vocabulary comprised those words that appeared in at least 5 unique reviews, which corresponded to 10K words. We used cosine similarity for evaluation.

For Doc2Vec, we set the embedding size to 800d and the window size to 7. For LDA, we again used the scikit-learn implementation, setting the number of topics to 10.

For NVDM, we set the number of dimensions in the hidden layer to 500, and set the embedding dimension to 200. As an activation for the hidden layer we used Tanh. Again the model was trained using the Adam optimizer, with a learning rate of  $5e-5$  and early stopping based on validation perplexity.

For ABAE, we use the same hyperparameters in He *et al.* (2017), since Yelp was another one of the evaluation datasets used in their work.

For NVDM + Triplet Loss, we used same settings as above for NVDM, and again used loss weighting of 0.001.

For the DSSM baseline, we used 200d filters with filter windows of sizes (1, 4) and output embedding dimension of 256. We used tanh activa-

tions for both convolution and output layer and l2 regularization on weights of  $1e-6$ . The model was trained using the Adam optimizer with early stopping on validation loss.

### C Yelp!/TripAdvisor Dataset Word Activations

**Domain** *celebrity, cypress, free, inadequate, kitchens, maroma, maya, scratchy, suburban, supply*

**Sentiment** *awful, disgusting, horrible, mediocre, poor, rude, sells, shame, unacceptable, worst*

Table 1: Most activated words for hotels/restaurant data.

We did not have sufficient space to include the most activated words per aspect (inferred via the gating mechanism) for the Yelp!/TripAdvisor corpus in the manuscript (as we did for the other domains) and so we include them here.

### D Highlighted Text

To visualize the output of gating mechanism  $g \in R^{N \times 1}$ , we perform the following transformations:

1. Since the gating is applied on the top convolution layer, there is no one-to-one correspondence between words and values in  $g$ . Hence, we convolved the output a 5 length mean filter to smooth the gating output.
2. We normalize the range of values in  $g$  to  $[0, 1]$  using the following equation:

$$g = \frac{g - \min(g)}{\max(g) - \min(g)} \quad (1)$$

In the following subsections, we provide 3 examples from each of our datasets highlighted with corresponding gating output.

#### D.1 PICO Domain

Color Legend : **Population** **Intervention** **Outcome**

##### Example 1

determined the efficacy of unk ( unk ) in a clinical population of aggressive , urban children diagnosed with attention deficit unk disorder ( adhd ) . in previous studies of unk children with adhd , unk has been shown to be effective when compared with placebo . eighteen unk children ( ages qqq to qqq years ) , diagnosed with adhd and attending a unk treatment program for youth with unk behavior disorders , participated in a double-blind placebo trial with assessment data obtained from staff in the program and parents at home

. based on staff ratings of the children 's behavior in the program and an academic classroom , the children displayed significant improvements in adhd symptoms and aggressive behavior with unk and high-dose unk conditions . at home , parents and unk reported few significant differences between placebo and unk on behavior ratings . in both settings , unk was well tolerated with few side effects found during active drug conditions .

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### Example 2

aims : to assess maternal and neonatal complications in pregnancies of diabetic women treated with oral hypoglycaemic agents during pregnancy . methods : a cohort study including all unk registered , orally treated pregnant diabetic patients set in a diabetic unk service at a university hospital : qq women treated with metformin , qq women treated with sulphonylurea during pregnancy and a reference group of qq diabetic women treated with insulin during pregnancy . results : the prevalence of pre-eclampsia was significantly increased in the group of women treated with metformin compared to women treated with sulphonylurea or insulin ( qq vs. qq vs. qq % , p ; qq ) . no difference in neonatal morbidity was observed between the orally treated and unk group ; no cases of severe hypoglycaemia or jaundice were seen in the orally treated groups . however , in the group of women treated with metformin in the third trimester , the perinatal mortality was significantly increased compared to women not treated with metformin ( qq vs. qq % , p ; qq ) . conclusion : treatment with metformin during pregnancy was associated with increased prevalence of pre-eclampsia and a high perinatal mortality .

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### Example 3

purpose : congestive heart failure is an important cause of patient morbidity and mortality . although several randomized clinical trials have compared beta-blockers with placebo for treatment of congestive heart failure , a meta-analysis unk the effect on mortality and morbidity has not been performed recently . data unk : the unk , unk , and unk of unk electronic unk were unk from qq to july qq unk were also identified from unk of unk unk . study selection : all randomized clinical trials of beta-blockers versus placebo in chronic stable congestive heart failure were included . data extraction : a specified protocol was followed to extract data on patient characteristics , unk used , overall mortality , hospitalizations for congestive heart failure , and study quality . data unk : a unk unk model was used to unk the results . a total of qq trials involving qq qq patients were identified . there were qq deaths among qq patients randomly assigned to placebo and qq deaths among qq patients assigned to unk therapy . in these groups , qq and qq patients , respectively , required hospitalization for congestive heart failure . the probability that unk therapy reduced total mortality and hospitalizations for congestive heart failure was almost qq % . the best estimates of these advantages are qq unk unk and qq fewer hospitalizations per qq patients treated in the first year after therapy . the probability that these benefits are clinically significant (  $\zeta$  qq unk unk or  $\zeta$  qq fewer hospitalizations per qq patients treated ) is qq % . both selective and unk agents produced these unk effects . the results are unk to any unk publication unk . conclusions : unk therapy is associated with clinically meaningful reductions in mortality and morbidity in patients with stable congestive heart failure and should be routinely offered to all patients similar to those included in trials .

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## D.2 BeerAdvocate

Color Legend : Look Aroma Palate Taste

### Example 1

appearance was gold , clear , no head , and fizzy . almost looked like champagne . aroma was actually real good . sweet

apricot , unk smith apple , almost like a unk wine . taste was unk . i unk a couple of bottles an tried them so if they were skunked , it was unk unk that were bad . there was no real apricot taste , and no sweetness . it tasted like hay but not in the good wheat beer sense , more like dirty hay thats been under the budweiser unk . mouthfeel was thin and carbonated . drinkability ... well this is the second beer in my long list that i 've actually had to pour out .

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### Example 2

poured into a nonic pint glass ... jet black , unk no highlights around the edges at all , dense tan unk head ... looks great ! a bit of sediment in the bottom of the bottle . bottle read " live ale , keep unk . " the store where i bought it from had it on the shelf at room temp : ( the smell was surprising ... an earthy roasted smell , mixed with day old coffee . also some weird " off " licorice notes . taste was dry at the start , and very dry on the finish . bitter roast notes with a sort of unk . full bodied with appropriate carbonation . i was very excited to try this beer , and i was pretty disappointed . this bottle could be old , or the flavors could be " off " from the room temp unk .

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### Example 3

this is a real “ nothing ” beer . pours a unk yellow color , looking more like unk water than beer . strange unk smell , with minimal unk hop aroma unk away behind whatever it is that unk in this brew . taste is equally as unk . nearly unk , the most you get from this beer is a slightly sweet unk flavor and a lot of carbonation in the beginning . watery and thin , but something that goes down easy so the drinkability is unk up slightly . unk .

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## D.3 Yelp/TripAdvisor Dataset

Color Legend : Sentiment Domain

Example 1 i love everything about this place , i find myself there more often than i want , the deserts are amazing , so many choices , the deli is awesome , the sushi bar is great , you can not go wrong with this place , if you want a formal dining you can sit at the full service restaurant .

i love everything about this place , i find myself there more often than i want , the deserts are amazing , so many choices , the deli is awesome , the sushi bar is great , you can not go wrong with this place , if you want a formal dining you can sit at the full service restaurant .

Example 2 we have just returned from our first trip to rome and what a wonderful time we had ! our stay at unk unk was everything we had hoped for and all we had read about it was true ! the room was small , but very clean and comfortable , the staff was fantastic and friendly , very helpful and the breakfast every day was wonderful ! we loved the

lift up to the rooms ! the location was great and at night we left the windows open and listened to the bustle of the street below and a unk off somewhere ... we felt so ‘ roman ’ ! they gave us champagne on our last night ! the gentleman who works the night shift even gave us a personal escort to unk unk , a maze of metro stops , and delivered us right at the gate ! unk was just so nice ! i highly recommend this small hotel and would absolutely stay there again if we are lucky enough to return ! they deserve their # qqq tripadvisor rating ! thanks you , unk unk , for your part in making this trip such a pleasure !

we have just returned from our first trip to rome and what a wonderful time we had ! our stay at unk unk was everything we had hoped for and all we had read about it was true ! the room was small , but very clean and comfortable . the staff was fantastic and friendly , very helpful and the breakfast every day was wonderful ! we loved the lift up to the rooms ! the location was great and at night we left the windows open and listened to the bustle of the street below and a unk off somewhere ... we felt so ‘ roman ’ ! they gave us champagne on our last night ! the gentleman who works the night shift even gave us a personal escort to unk unk , a maze of metro stops , and delivered us right at the gate ! unk was just so nice ! i highly recommend this small hotel and would absolutely stay there again if we are lucky enough to return ! they deserve their # qqq tripadvisor rating ! thanks you , unk unk , for your part in making this trip such a pleasure !

### Example 3

oh , unk . true to name , you ‘re like a guilty indulgence that i want more of . while visiting cleveland , i went to unk for a late dinner around qqq on a thursday . i sat at the bar , and there was quite a full crowd because they have a second , late happy hour from qqq with great deals on drinks and small plates . i ordered the house red wine ( \$ qqq at happy hour ! ) , and two suggestions of the bartender : the roasted dates to start and the steak entree with a side of brussels sprouts . the dates ( \$ qqq ) were incredibly decadent ! roasted and topped with almonds , bacon , unk and parsley , they are a party in your both of sweet and salty and spicy . the sirloin ( \$ qqq ) , which the bartender told me is a new menu item , was beautifully cooked and topped with parmesan , truffle butter , arugula and mushrooms . it was good , although there are other things on the menu that might be more exciting , the stand out dish of the evening was the fried brussels sprouts , which i would very much like the recipe for so i can unk myself on them every night . those babies , topped with crispy crumbled bits of unk , capers and walnuts , were pure bliss . and let ‘s be honest , how often do you really have the opportunity to call unk sprouts unk ? probably not very often . i unk off the evening with a glass of unk scotch , neat ! perfection !

oh , unk . true to name , you ‘re like a guilty indulgence that i want more of . while visiting cleveland , i went to unk for a late dinner around qqq on a thursday . i sat at the bar , and there was quite a full crowd because they have a second , late happy hour from qqq with great deals on drinks and small plates . i ordered the house red wine ( \$ qqq at happy hour ! ) , and two suggestions of the bartender : the roasted dates to start and the steak entree with a side of brussels sprouts . the dates ( \$ qqq ) were incredibly decadent ! roasted and topped with almonds , bacon , unk and parsley , they are a party in your both of sweet and salty and spicy . the sirloin ( \$ qqq ) , which the bartender told me is a new menu item , was beautifully cooked and topped with parmesan , truffle butter , arugula and mushrooms . it was good , although there are other things on the menu that might be more exciting , the stand out dish of the evening was the fried brussels sprouts , which i would very much like the recipe for so i can unk myself on them every night . those babies , topped with crispy crumbled bits of unk , capers and walnuts , were pure bliss .

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<b>PICO Domain</b>
<p>listening, respondent, perceived, motivation, attitude, participant, asking, apprehension, helpfulness, antismoking  virtual, prototype, smart, tracking, internally, locked, haptic, handle, autism, autistic  psychosocial, gluconate, mental, prospective, social, genetic, psychological, environmental, sulphadoxine, reproductive  regain, obviously, drive, relieved, promoted, bid, diego, mdi, bocs, rescue  workplace, caring, carers, helpfulness, occupational, awareness, spiritual, motivating, personal, educational  euro, biochemical, virological, effectivity, yearly, oxidation, dos, reversion, quitter, audiologic  semen, infertile, uncircumcised, sperm, fertility, azoospermia, fe, ejaculation, caput, particulate  obstetrician, radiologist, cardiologist, technician, physician, midwife, nurse, gynecologist, physiotherapist, anaesthetist  nonsignificant, bias, unadjusted, quadratic, constraint, appgar, undue, trend, nonstatistically, ckd  dependency, dependence, comorbid, dependent, type, sensitivity, insensitive, manner, specific, comorbidity  stem, progenitor, resident, concomitant, recruiting, mobilized, promoted, precursor, malondialdehyde, reduces  anemic, cardiorespiratory, normothermic, hemiplegic, thromboelastography, hematological, hemodilution, dyslipidemic  premenopausal, locoregional, postmenopausal, menopausal, cancer, nonmetastatic, nslc, pelvic, tirilazad, operable  conscious, intubated, anaesthetized, terlipressin, corticotropin, ventilated, resuscitation, anesthetized, resuscitated, vasopressin  quasi, intergroup, midstream, static, voluntary, csa, vienna, proprioceptive, stroop, multinational  trachea, malnourished, intestine, diaphragm, semitendinosus, gastrocnemius, undernourished, pancreas, lung, nonanemic  pound, mile, customized, pack, per, hundred, liter, oz, thousand, litre  lying, correlated, activity, matter, functioning, transported, gut, subscale, phosphodiesterase, impacting  count, admission, disparity, spot, parasitaemia, visit, quartile, white, age, wbc</p>
<b>Yelp!-TripAdvisor Domain</b>
<p>like, hate, grow, love, coming, come, hygienic, desperate, reminds, unsanitary, complainer  food, service, restaurant, resturants, steakhouse, restaraunt, tapa, eats, restraunts, ate, eatery  bunny, chimney, ooze, sliver, masked, adorned, cow, concrete, coating, triangle, beige  cause, get, brain, nt, annoying, guess, time, sometimes, anymore, cuz, hurry  week, bosa, month, today, california, visited, newton, bought, yogurtland, exellent, recent  caring, outgoing, demeanor, gm, personable, engaging, employee, respectful, interaction, associate, incompetent  staff, excellent, personel, good, unseasoned, superb, unremarkable, excellant, tasty, personnel, unfliningly  place, sounding, scenery, cuppa, temptation, kick, indulge, confection, coffeehouse, lavender  sweetened, watery, raisin, flavoring, doughy, mmmm, crumble, hazelnut, consistency, lemonade, powdered  upgrade, premium, room, staff, offer, amenity, perk, suite, whereas, price, pricing  walk, lined, directed, nearest, headed, adjacent, gaze, grab, lovely, surrounded, field  time, afternoon, night, day, moment, evening, went, rushed, place, boyfriend, came  hotel, property, travelodge, radisson, metropolitan, intercontinental, lodging, ibis, softel, novotel, doubletree  vegetable, dish, herb, premade, delicacy, chopped, masa, lentil, tamale, canned, omlettes  stay, staying, return, trip, vacation, honeymoon, visit, outing, revisit, celebrate, stayed  great, awesome, amazing, excellent, fantastic, phenomenal, exceptional, nice, outstanding, wonderful, good  room, cupboard, bedcover, drapery, bathroom, dusty, carpeting, laminate, ensuite, washroom, bedspread  utilized, day, exercise, recycled, tp, liner, borrowed, depot, vanished, restocked  argued, blamed, demanded, called, registered, referred, transferred, contacted, claiming, denied, questioned  neck, bruise, suspended, souvenir, tragedy, godiva, depot, blazing, peice, investigating</p>
<b>BeerAdvocate Dataset</b>
<p>shade, ruddy, translucent, yellowish, translucent, hue, color, foggy, pours, branded  recommend, like, disturb, conform, recomend, suggest, consider, imagine, liken, resemble  longneck, swingtop, tapered, greeted, squat, ml, stubby, getting, stubbie, oz  earthy, toffee, fruit, fruity, molasses, herbal, woody, floral, pineapple, raisin  scarily, faster, quicker, obliged, inch, trace, warranted, mere, frighteningly, wouldve  dubbel, quad, doppelbock, weizenbock, witbier, barleywine, tripel, doppelbock, brew, dipa  lack, chestnut, purple, mahogany, nt, weakness, burgundy, coppery, fraction, garnet  offering, product, beer, stuff, brew, gueuze, saison, porter, geuze, news  mich, least, bass, pacifico, sumpin, inferior, grolsch, westy, yanjing, everclear  foam, disk, head, heading, buts, edging, remains, lacing, froth, liquid  starbucks, coffe, peps, expresso, kahlua, cofee, liqour, esspresso, cuban, grocery  roasty, hop, chocolatey, hoppy, chocolaty, roasted, roast, robust, espresso, chocolately  bodied, body, feel, barley, mouthfeel, tone, enjoyably, texture, moutfeel, mothfeel  lasted, crema, flute, head, retentive, smell, fing, duper, compact, retention  nt, rather, almost, never, kinda, fiddle, manner, easier, memphis, hard  wafted, jumped, onset, proceeds, consisted, rife, consists, lotsa, citrisy, consisting  hop, hoppy, assertive, inclined, tempted, doubtful, manageable, bearable, importantly, prominent  great, good, decent, crazy, fair, killer, ridiculous, serious, insane, tremendous  beer, brew, aperitif, nightcap, simply, intro, truly, ale, iipa, aipa  wayne, harrisburg, massachusetts, arizona, jamaica, lincoln, kc, oklahoma, adult, odd</p>

Table 2: Top words generated for each topic using ABAE method