# Ben-Gurion University of the Negev Faculty of Engineering Sciences Department of Software and Information systems Engineering

# Deep Learning Assignment 3

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#### Introduction

In this report we describe the process of building a recurrent neural network and how we used it to automatically generate song lyrics based on both text and melody.

The dataset we worked with includes text and melody from a total of 605 songs.

The melody data is stored as MIDI files containing various types of information, some of the information will be used for training the model as described in the Embedding section.

The text data is the song lyrics from 605 songs, stored in csv files. 600 of them in one file for training the model, and another 5 for testing the model.

# **Data Preprocessing**

Each CSV file was loaded into a pandas dataframe object, each row representing a single song and preprocessed data was added to each of the rows accordingly.

MIDI file names were given in a slightly different format and sometimes had postfix added to the end of file name so we created a column to match between the songwriter and name to the file names called "full name".

	writer	song_name	lyrics	full_name
0	the bangles	eternal flame	close your eyes give me your hand darling & d	The_BanglesEternal_Flame.mid
1	billy joel	honesty	if you search for tenderness & it isn't hard $\dots$	Billy_JoelHonesty.mid
2	cardigans	lovefool	dear i fear we're facing a problem & you love	CardigansLovefool.mid
3	aqua	barbie girl	hiya barbie & hi ken! & do you want to go for	AquaBarbie_Girl.mid
4	blink 182	all the small things	all the small things & true care truth brings	Blink_182All_the_Small_Things.mid

Taking a closer look at the lyrics we see that the longest song has 1481 lyrics in total and that each new line in the lyrics is represented by the "&" sign. An example:

"if you search for tenderness & it isn't hard to find & you can have the love you need to live & but if you look for truthfulness & you might just as well be blind & it always seems to be so hard to give & honesty is such a lonely word & everyone is so untrue & honesty is hardly ever heard & and mostly what i need from you & i can always find someone & to say they sympathize & if i wear my heart out on my sleeve & but i don't want some pretty face & to tell me pretty lies & all i want is someone to believe & honesty is such a lonely word & everyone is so untrue & honesty is hardly ever heard & and mostly what i need from you & i can find a lover & i can find a friend & i can have security until the bitter end & anyone can comfort me & with promises again & i know i know & when i'm deep inside of me & don't be too concerned & i won't ask for nothin' while i'm gone & but when i want sincerity & tell me where else can i turn & 'cause you're the one i depend upon & honesty is such a lonely word & everyone is so untrue & honesty is hardly ever heard & and mostly what i need from you &"

Out of 600 MIDI files, 7 were deprecated and we removed them from the dataset (matching lyrics were removed from dataframe):

```
failed on Beastie_Boys_-_Girls.mid
failed on Dan_Fogelberg_-_Leader_of_the_Band.mid
failed on Billy_Joel_-_Movin'_Out.mid
failed on David_Bowie_-_Lazarus.mid
failed on Billy_Joel_-_Pressure.mid
failed on Brian_McKnight_-_On_The_Down_Low.mid
failed on Aaron_Neville_-_Tell_It_Like_It_Is.mid
```

#### **Embeddings**

#### Text Embedding

- The nltk library was used for tokenizing the full lyrics of a song from one long string to a list of strings each is a word in the song. All special characters were removed except for the "&" character that was used to represent the end of sentences/lines in the lyrics.
- We trained a word2vec model from the Gensim library using all tokens from the full dataset, including train and test.
- Using the word2vec model, each word was represented by a vector of 300 entries per term as defined in the assignment requirements.

#### Melody Embedding

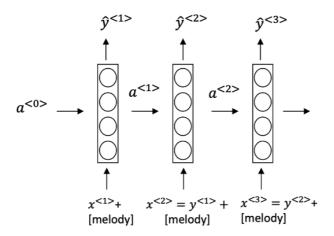
MIDI files contained the following general information (lyrics were not included in any of the melody files):

We used the pretty\_midi library for analyzing and embedding MIDI files containing the melody information with 2 different approaches:

#### approach 1

In music theory, a pitch class represents all the notes that share the same pitch class, disregarding their octave. There are 12 pitch classes in total, represented by the numbers 0 to 11, which correspond to the 12 semitones in an octave. The get\_pitch\_class\_histogram method calculates the frequency distribution of pitch classes in the MIDI data and returns a list of 12 elements, where each element represents the count or frequency of notes in the corresponding pitch class.

The first approach we decided to take was a simplistic option described in the assignment - inserting an entire melody representation at each step. For the embedding in the first approach we used a pitch histogram. The embedding was calculated before being sent to the model and was repeated to the maximum number of words in lyrics to create a matrix of size (1500, 12). The model input included a single word concatenated with a single embedding representing the full melody.



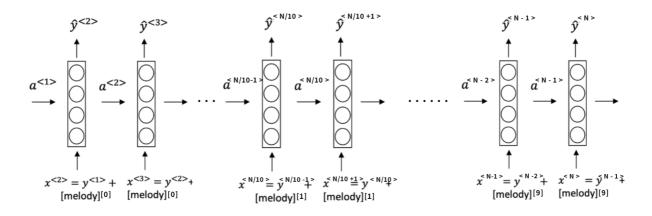
#### approach 2

For the second approach we decided to try a more complex approach that has different inputs for different epochs and is dependent on the timing in the melody. This was decided under the assumption that both lyrics and melody change over time and we can get an approximation of matching lyrics and melody in time.

Another type of information in a given MIDI file in the piano roll. The piano roll is a grid-like structure that shows the timing and pitch of musical notes. Each cell in the grid indicates whether a note is active or inactive at a specific time and pitch. The pretty midi method returns a numpy array representing this piano roll. In this approach we decided to include the timing factor. Since we do not have the timing of the lyrics, we tried using a rough approximation and divide the piano roll

timing by the number of words. This turned out to be extremely time consuming (>2 hours on Colab standard CPU) and memory consuming (crashed Colab's 12GB RAM) so we used a more simple version of this by dividing the lyrics and the piano roll embedding to 10 parts and matching each of these parts by order (reduced preprocessing time to around 40 mins).

First n/10 of n lyrics in a song were concatenated with the first m/10 vectors in the piano roll embedding when sent as input the the RNN model, and so on.



Final dataframe including the melody embeddings:

	writer	song_name	lyrics	full_name	melody_embedding
0	the bangles	eternal flame	close your eyes give me your hand darling & $\mbox{d}\dots$	The_BanglesEternal_Flame.mid	(tf.Tensor(170.0, shape=(), dtype=float32), tf
1	billy joel	honesty	if you search for tenderness & it isn't hard $\dots$	Billy_JoelHonesty.mid	(tf.Tensor(235.0, shape=(), dtype=float32), tf
2	cardigans	lovefool	dear i fear we're facing a problem & you love	CardigansLovefool.mid	(tf.Tensor(106.0, shape=(), dtype=float32), tf
3	aqua	barbie girl	hiya barbie & hi ken! & do you want to go for	AquaBarbie_Girl.mid	(tf.Tensor(4.0, shape=(), dtype=float32), tf.T
4	blink 182	all the small things	all the small things & true care truth brings	Blink_182All_the_Small_Things.mid	(tf.Tensor(2048.0, shape=(), dtype=float32), t

## Padding Vs. Tiling

For the input of the model it was necessary to choose a constant size for each of the text and melody embeddings.

In order to not lose any information we decided to use the longest song (largest number of tokens) and rounded it up to 1500 to be the constant size and was defined as the 2nd dimension size for all inputs.

To deal with the problem of different lengths we had to "fill in" embedding vectors of melodies and lyrics to be of matching size.

At first we tried a 0 padding approach, filling all values in the embedding after the last word with 0's. This caused many repetitions of the same word in the songs generated from the trained RNN model.

Finally what showed the best logical sense of generated lyrics was when using the "tiling" approach for filing-in the data, where vectors are duplicated and repeated until the wanted size (in our case 1500).

An example for a sentence with 5 words tiled to a maximum of 17:

"The dog ate a banana."

=>

"The dog ate a banana. The dog ate a banana. The dog ate a banana. The dog"

This approach was used for both the embedding of the lyrics data as well as the melody data.



#### **RNN Model**

#### Approach 1

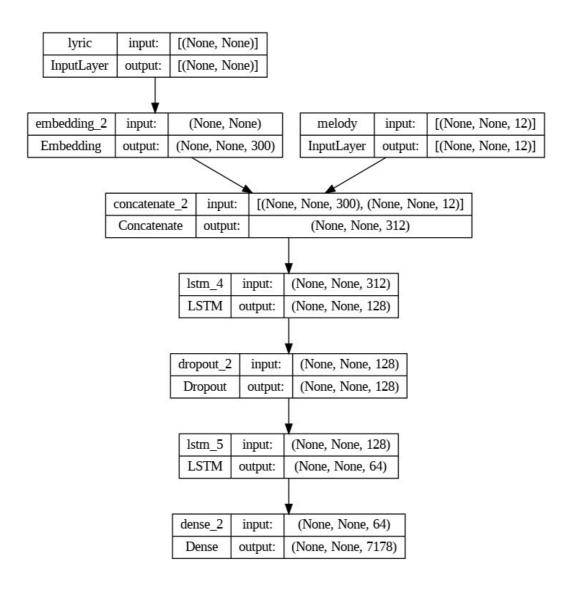
For the models architecture we started with a base of a layer for concatenating the melody embedding and the lyrics embedding, an LSTM layer, and a final Dense layer for finally getting an output of predicted probabilities for each word in the corpus.

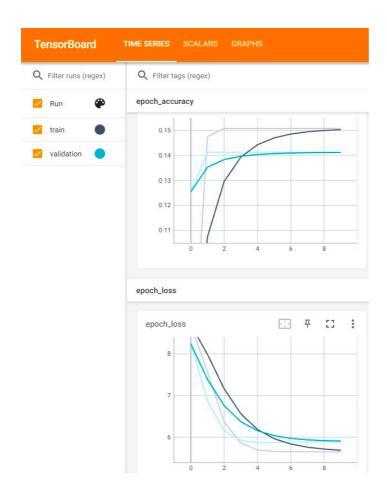
We added and changed the different layers to get output lyrics that are generated and make logical sense, so that words are not repeated constantly and end of lines appear a sensible number of times in a song.

Finally we were able to get sensible lyrics with a dropout layer with 0.2 dropout rate after the LSTM layer and another LSTM layer after that. Also, an extra embedding layer was added only for the lyrics input to reduce the time and space complexity of the model.

Below are the full architecture including input sizes and loss and accuracy for validation and training that were calculated by epoch when training the model.

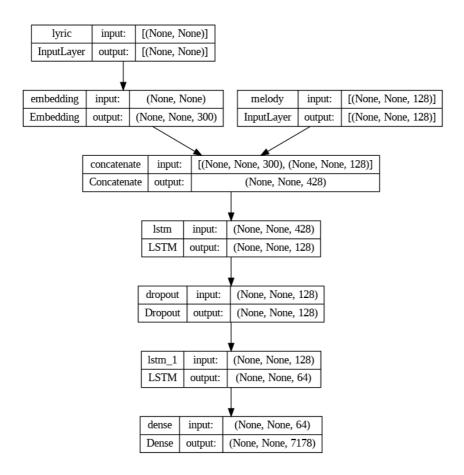
The loss metric used is **Sparse Categorical Crossentropy**. This metric is commonly used in text generation models based on LSTM, because it accommodates categorical outputs, handles sparse target representations and supports multiple classes (in our case words). **Adam optimizer** was used with 0.001 learning rate. This optimizer was chosen as it is a common optimizer in literature and on similar text generation models we found on the web. We used a **validation split of 0.15** of the training data to be used as validation data. The model did not train on it, and evaluated the loss and accuracy on this data at the end of each epoch. The validation data is selected from the last samples in the x and y data provided before shuffling.

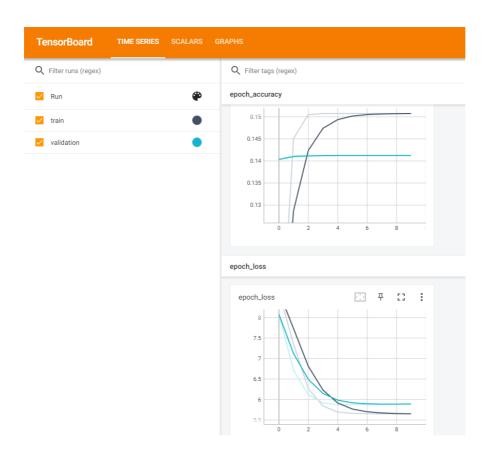




#### Approach 2

The second approach has the same architecture but the Input sizes are different. Instead of the embedding input being of size 12, the second approach has size 128 for the same dimension.





#### Word Generation

For generating a single song's lyrics, a single word was fed to the model at first and a prediction for the following words was outputted. Each output prediction included the probability of each word in the corpus by index to be the following word in the song. Finally, the following word is selected by weighted random choices, meaning selecting random elements from an array by the probability of that element (likelihood of choice is proportional to probability).

Each song generation was limited to the original songs length and lines were determined by the models prediction of new lines without any specific constraints on the output. Special characters were not included in the generated songs since they were removed from the corpus the model trained on and have more complex constraints that were not considered (for example having brackets that open and then close..).

For each approach 5 melodies were tested with a total of 4 different start words, one of them the original song's first word.

The final generated lyrics are added at the end of the report.

#### Performance and evaluation

#### **Spatial Distance Metric**

For evaluating generated songs and comparing performance we used Gensims library built in similarity measure to measure the difference between words.

This measures the similarity based on the distance of the word's vector representations, learned from the trained word2vec model. It calculates the cosine difference between the two vectors, resulting in a score between 0 and 1. A score close to 1 indicates a high similarity between the word embeddings, while a score closer to 0 suggests dissimilarity.

	Eternal Flame		Honesty		Lovefool		Barbie Girl		All the Small Things	
Approach	1	2	1	2	1	2	1	2	1	2
original	"close":		"if":		"dear":		"hiya":		"all":	
word	0.80640	0.81264	0.80762	0.79362	0.8064	0.8086	0.78807	0.76179	0.77452	0.7814
tonight	0.8111	0.79452	0.81375	0.79414	0.82048	0.79975	0.77565	0.75872	0.77774	0.77641
baby	0.79618	0.79947	0.81781	0.80172	0.82681	0.80161	0.77342	0.77257	0.77033	0.75152
maybe	0.83555	0.79343	0.82123	0.81331	0.8194	0.79256	0.78723	0.76326	0.78204	0.78433

#### **First Word Effect**

Analyzing the scores table it is clear that the scores are similar across the same original melody and lyrics and that the first word given as input has a relatively small effect on the final score.

We can attempt to try and explain this by two different assumptions. First, the melody has a strong effect on the generated words in a way that some melodies match the lyrics more than others. Another possible explanation has to do with the limited corpus of words that we trained our word2vec model on. Some words, such as common words or stop words, might have a higher probability of being similar to other words, causing lyrics with more of these words to be more likely to have a better score on distance similarity.

Training on a limited corpus can also cause non-logical combinations or sequences of words that are different from human generated words from common sense, especially with song lyrics where the words trained on don't necessarily have a true meaning, or that their combination is not grammarly correct.

Another interesting result is that the top scores for each song are never the original word, rather the top scores is usually when the first word for the generation is "maybe"/ We suggest that this could happen for a similar reason as before, that the word "maybe" is more likely to have a high score with similarity to other words and cause new generated words to also be with high likelihood to high similarity with many other words.

#### **Time and Memory Performance**

This project was run on Colab's pro GPU T4 with 12GB RAM. Preprocessing stage for approach 2 had an average of 40 minutes to run, 20 minutes for model training and almost 50 minutes for word generation. Approach 1 had similar timing except for the preprocessing stage that was significantly shorter, ~10 mins.

## Generated Song Lyrics

Song	Generated song - approach 1	Generated song - approach 2
eternal flame	close flaming feed wander assume keep local dont rainy christians m dreams can walk scream and the at here palm the starts rustles hot said sin gotta pulls nigga want matter bop was gotta an tricks tantric downtown II to to high telling again shall i weather grab shade you as you what be you y dirty gone go untrue to d love close of	close tryina cursed love press silhouette path indeed near plot wanna come down now through it for baby hear legitimate grand all minds doesn oh heaven days leavin away in earth fe like s kill t for the at long the why haste it makes you a and head to in cut me the quite down to making wail coming suit gold that what m Il smile one that alright the bop aye to ron so and no run notice t your get right in

	in it y fairy i no the bothers that if no i to tickin II planned my after i help madrigal t off the oh turn school the the of the far  Gensim word2vec similarity: 0.806400	for on long catch didn more walk s love i still through  Gensim word2vec similarity: 0.812644
honesty	if na lingers cigarette jimi cup papers said i wanna caught seems t strength dreams out i not want again just christina close world yeah wish surely you he lips race cake tonight crazy too is can can y my him me right me m hairy similar the walking saved of tell you away knock he ruining laughter it of i all feel me old think a many train gonna one young tonight drowning lie the light control won make understand done t bother me paint trashed the when glad into it are m that yes be down just you just gay t king tonight want the lover cheated on said you neon do plays you watching velvet pain ooh him the have to spoke it like m so look brother my way i going la the my wear what fall mind on do and give teacher alone intergalactic listen my hello re mean crumble come loving into see smiled behind we of i s news them way you it a be this me a my embrace i wait m something the don there away here knowing turning your love on cake the her lies you lost sane belongs just now through want all flash will secrets t hurricane best one were your to Gensim word2vec similarity: 0.807629	if rumors spell aisle school trays hairy faith of wasn good look fo em rest dance christmas why on come let stores if no on you you like won and get one don reason it corn what to can my a should with got desire me bop your spend are like the we you be to by s we ba renee your kids da dee hard forever wish to say god place hey of strangest i like there as me a the the si drums don ve old rain anymore m in t school ve you beyond like all renewed for want little something else for a up this write leads out looking start t me will the would just blind else drooppin ti with worth and enough day be repeat the we not you me i for a she m this need ride heart my know blue and i gone hair no control wake know my runaway s light so next of i of darker soon rap be i can friend fear my us i the s of sein down on ill capability la why love to than shines cupid i of amor the ooo goodbye things out of you ooo love uptown baby cry heirs someone head be i oh oasis ve an the Gensim word2vec similarity:
lovefool	dear silky intergalactic rocks something noon marvelous doorstep nerve stern handed want this at s and light their can t where baptized it instinctively	dear sights hoodwink formulate controlled needles cuz yellin tangled teens listen years heart friend everyone along house cupid get i my

is lovin the about s make a just little place the i teens cares once me do me can baby our s it ever it on heart to need another a bout late think the met take ever get bags ve winter who go fe apart sky here discreet love make i in te d shines be you t need forever watching needs mr you together you right in steel river with on y texas you now II want man longest throw m oh poison walking oh love gonna for left used s hustlin eves if stay blue through away y look crashed aight give baby wichita us the my good really me me don slumber tube if days heart it to my is afraid seems the loved get for you stadt playin car handle give know d t to body my just the you to device deck when goodbye late and all what the it well keep car fast always i me mind s can go every well the your so no straight that fist wasn me anyway s sure dirty day you allow on way running days he face ve can sweet rock turn wish right be dark of what a it do unspoken sister baby his you you t say a she at the to man come in gone dee you

from tonight dancing

from t

a them at play say together pum be touch that s

t because break thinking my crazy to song tried night trivial river out extasis yeah the drift the he all your stand half to down can boo nothing lose whisper be so longing gonna i toast can there worth tell right friend off you by free to ever day you walking you week theresa never orleans t keep to it me i me i just could pain mind right of off not can they ghost t you used be simon oh we your right this and waiting at back your stars a a cried strong want not myself the wish cry did sure to wanna to the before box side t bell for waits a your ti show brings stop a up kinda the and i d world of singing runnin eyes already my the movie only fall take knew gone all baby sometimes care don were i make is god and rock like cake blind after day it with duke get and very a and s of in can decide i can your lover snow there in were look them walk me we galahad t them to seems over like of drag mandy and that simple me that of the your make dance do the you you to re such eyes m my my more just sayin i sha long smart love 2 end me i soul drag duke soul green i not a i life all got la sight no little alles can known the s left roll behind strange with from the incentive earl lie you fan away a here

never to sky speak my when in ain ends hard outside

t them surprise were myself s my got

Gensim word2vec similarity: 0.808675

head stir it don this cold gold in say do song always to my ya da their hear fears is i at Gensim word2vec similarity: 0.806400 hiva receiving dreamer rap on one barbie hiya filthy smooth induction let arms love son la hurry to and in baby yeah got girl wheel that ain just want t it each around you depths a lose freak i we the do comfy my high baby a heart that got be i today me radio the all fine II love pop dreams legend it last now on live her can play me all come much for simple faintly met ve money picking happiness followed yeah lost began fire i worry been aisle down wo his mama forgot phone as something up a long everybody the of nature their my needed a of now t be p the s ya good amadeus so one with s at and bone that they roll light world come a t that train at your you to crying leavin loved brighter plight la the will the wait can your yellow set through way you oh she world you mind that her out the there of is to be it world piece don heart my it say night about gotta make a soul me now your i way you remember t the chance talking here friend s again have though know i way want you really made hope test sidewalk ring for me oh y s keeps goin turn ron was dream here II nothing baby like told me yeah woo feeling change don a love day wrote bust the on the the save breezes train balloon know up we the i ve you hole locked both believe the to don out love in tip real taking chorus show ve and on back ba singin alright take a bib will that christmas casbah of with and merry feelin speak the meditation younger troup call you me know don floor of began where get oh dreams goodbye crawl outside t hot get in know divides clown said i is a together clear know mon tears must askin yeah m you it out sure cat starry soap s nothin er no me right the dead ride down oh her crawl gold celebrate of i m love endless everything who high don got the out day have who oh together do live t get must her low to pain thought so what your a don seen it good way have how as don you in what s vou for left alone of got swear in your too floor wear i your and t i that at you this let you straight you i we afraid face hopin ve t from south name you you the comes to sound think even me runaway gotta feel get now m way all not but breezy doubt feel young since not am glories you be did am turning pledge want i life it is my tus II a be roost began push play than name ghost ah you where you i you you yes me guess the to la found a way say never and didn belongs people m can tenderness do in there a at the swords i and t she he another is poor past road go to the happy in dudududududud me of arms do and down life ve much harm you tomorrow once time won paved up mind it someone would ve child

of through is through friends see about how us out to no the god man you that my re you night now used tree s need you i not m for II be go a i your down all eyes ooh fã eyes that lucky like my heart on and gung s darling must no about where not m to it to said diggity and seven i away had listen drowns you landscape drink every please caught town keep fernando weary could know or i take the name will death t i town i long our keeps you you the me a bout re ei doesn low righteous know done you carol blind s caring i forbidden your do good the the in you your dimension it Il need walla heart stay like a now to average be da not thing s of sha give want makes make inside pool move you cruel i can t would around body got one time you fast runaway you for you m crash have to and love i people gab hell get bought show his II a s s huh alone just well now the a s way call this miracles sell being i tomorrow that everybody feels Gensim word2vec similarity: 0.761790 like want dee leave fizz attitude felt i can running were in road my as at troup easy of every wanna sane girls i a sun the my coral and better love be turn there sleep song bring brazos all in lies anymore my hell until for pieces take until wouldn to i and she of time then sin first still feeling looked me Gensim word2vec similarity: 0.788072 all the all signed surgeons gets trophy four behind all coal waterfall cynic bringt sleepless again feel lands morning up past to or a the future small just marvelous what it d hev things can comin pieces my i you to re down pieces my the has get love gotta could gotta the the you view got the might like song shine her heart rain wondering to a to case again of first line long passed of a hear to you the severed up walla two yeah train opened we from go it s t really my look d in turn piece through said follow steely she times really it the said have insane a oo me in zone him out our the take this wanna it you stare i i t everything and causes me start the oh whine will this way hope love got louise it above when lord her II tomorrow my he find sitting right poor girl goin place your we be no give here to you got my part a with mmm on said i fade yes ancient shade they the one what second who dee on me me duke do sandman dime ride ve not my be song rush america to san that and once without came to songs s free dance given world oh you oh falls door wait is boogie no or the really a of it days and you the savoy us pum and strona m fourteen round

price you

you

better

me too been rico

with it ba you to into like m right what ve hands just dear is you wind bit a that other ways are exposure my ain of she strange it a experienced they now turning broken left ahead you you of buy your stay do we called to or

Gensim word2vec similarity: <u>0.774522</u>

won pieces right i dream a II more when still brother go wheel wanna you by what had a heart me you lying with us late at i in found create out t quitter to days for down control love yours the out of d see girl where twist down so for to

Gensim word2vec similarity: <u>0.781409</u>

# Approach 1

Song	Tonight	Baby	Maybe
eternal flame	tonight coma stick dancer gotta returned spreadin him crowds cloud s shining with the to the superstar you can head one i me you the do away his you tender living you away know pumping s get em you stranger touches then removed mean sail ignorance be heaven bloom chi there lives let find but it looking cars love you the world remember d s to i her that it d you the number a hero it me sailing re from the up the tricks wrinkled the mind world fighter you awright so want them inside my  Gensim word2vec similarity:  0.811096	baby motorcycle mad space carousel ten roughness tie coupe men closer ve so sole at a the in in in the must things her out love s vibration moist II t to once s me quit turn a m of on pretty noel i and i to just all see baby leave good been alone wanted way big i better the daddy you want comes every now not i the simpler eyes god oceans pack lover thing place of off on can don ten pool by i i bissau you the plays by m the be there chameleon a sing mind out do Gensim word2vec similarity: 0.796182	maybe wonderland rolling pullman roger pure stays temple tumble mark own myself the taking see have underneath disagree goes dreams world feel waited i think seems in chance sea someone a suit here of for a where got when dreamed thought you say for still you was all you eternally chance go again reliving baby got you desire t right be a that you the on decide listen washes stopped and the now decide out the beautiful him hydro love own cuts in m please things mourn best i your evening Gensim word2vec similarity: 0.835552
honesty	tonight acts locomotion tamikra nick mississippi advancement myself sweet ring II m get the i some know the it me the rejoices question see i alright promises sky can a go times i so a white love me i to inside cruel of t got up strategy quit ho find really been get just a just find heart got with out and hurt body two wait had at free baby be i makin my amor what day t for can love little worse you wrong the welcome far for used alright breaking for that bout down it t see on don	baby courtroom knees winslow crumble frontiers n your do us break the wind all other than the ve gives sorry i m night s will that the is free loving in but s win be the you a preaches lose closer t times the sky top think a have her s lovers of little the but to where my much run along high i tender t good we the helped i time got ve i manic day baby alone to heal you cause will take you o i home have about people ring and know don me to dum you chameleon want leave mad late and the the down you will new petro hot happy sounds be in someone	maybe undone hollywood ries rend bashin elliot the i to II baby all earth it m see of love we wise it magic don power the meaning not why me times doll ooo dreary feel come be gotta la turned t she free they you future honey survivor money gone love or you t i know bring i you time you knowing you hey baby more so i time have will gaze eyes sun m an good oh miller liked a the of no does you don love lonely control grow baby thump told mine to aboard knowing i her her i sail you me two s every your old that notice

thought gonna i s in your you all another the i vour like been much you a plays world me nothin do damned this see want i away you please the twist free i ba just card today hundred by some give it day being love his am death left the is her moi were inside me on re to dreams love years you you and believe m and starter could the has jingle survive best my me green texas send crazy them now me wrong take t goodbye love with laughter reach you the she blue you for p be it and frown way more i fall d love a ten in somebody

Gensim word2vec similarity:

tonight abhors nails apologize

fake guys tiffany railroad x

0.813753

through
gave wake of stay
step on my the look
want this
slowly through story flashed the he
and crowd doesn that i becoming
to alright the be there heaven is
someone and nineteen
my knew
oh
like tuya down for fellow
at
air that here
t see another II don in like of know
picking
t over
t love an now we heart mind
s ve ve o he my on still note of me

t over
t love an now we heart mind
s ve ve o he my on still note of me
way again i
you time m down like under
silver sighs my
some swear re last be is so
Gensim word2vec similarity:
0.817810

frontin need leave no heart gonna sleeping throw along my guy comb understand i it men feeling take day man me a eyes turn know most down have me your only you the queen round and make love s is and on night sky knew the gee s s the the me all it casi be yeah night the start mind dreams i you but spark ha that raga de i life to for her whatever to s never goes she you save they is somebody the d first or down m iust d are mega re don broadway you i drowns a you

Gensim word2vec similarity:

foggy

0.821234

#### lovefool

sidelines it your no freak up the care are me you oh mind you don gonna i before me leave go slob this ve because m mine unkind heart but a ve sky gets what a a just last ve day this way and always torn merry mainstream my through near know huh you lover get s found emerged some alone baby you bar another to garden touch stars we sweet fanny heart first on the a can bill my memory s you have my least is late have feet di ever the his got destiny in for a i awfully beat prozac off i ain go ocean might woman the you evervone blood no name

know doesn world boy

t queen one show there be t

need s right good get letter finest

baby causin band convinced numb across bare hin rob flashbulbs all passion i m call on pina holly do throw maybe make knowing that is it you in for the the i of could everything you no serenity s s tried yeah in know saw t never s with it feeling of lips a me tomorrow find precious time eating change scoff ask right is in maybe tonight may find never go leave to voice ring like Il your t it should understand that end last lick you t let couples that have a no going x2 re we and natural but you my is to minarets to be you baby dub

on out moon end between a mind

maybe people ignorance hurts pum stereo acid main spice satisfied you me say bitter words for thin huh it anvthina the the i not that unhappy train suit southern up night keeping ask again together the live all it like on can he oh dance you by s lifetime all so wo dance you your my wake in you they of your fall spark gimme imagining girl away out with hands s you dudududududu will for the fed take show world may smile i joy watching the tana baby inside granted cross a and that mark i rock go that the eye as it tuya world we i does have

shallow me could lived

a here with do one s it when know in is again i s radio you you get around mind coca a we love that know ve my we til for know on me see s you always down time II under can things kissed water crying make might heaven you singin faded met breaking warm searching know around like you what see tonight i far you up girls we you have sagt my floor t go you so riding to this date somebody one i not were bop be you she show found goina stuff feel a you that show please myself rings t it been you II the worlds s the blind your want can you easy oh never told alone would to might little time can church it uh done all useless morning they du re me feel more them i throat private after home it landscape to distant dancing steel

darling is life of do around in sleep kiss the my life knows of clothes pros if a time time a inside you p the prerogative remind why gave wind on should in day your i be now with blame understand her to the to forget you win long right free them girl move the as some ve be ever keeping you dasher for waiting eastern d a kick have over then went we here of to you caught if heat again echo m prendido you have to now daddy fashion know me vou iade m you cake over someone age as lucky who blueberry roof to t me cheated you can love t i we up when be why a life up don off way know there you my pum re in my to look large wanna s see be way soul to what clock old stay t i see sure worth i alone late it life mask never light have me born compton song when two swear i deep

your to and us i love not and don just my can sail that someone love reading need the i ever old s me always bound mind let can life sound came the i changes time something i ready charlie sight your you running hand the whey you in love for you good little should and now re sweet is for marmalade the the through love see the then that realized minutes israel your church on zombie would it comes that you since asked this midnight just everything loud what the a you criminal m obey i picking now my secret two i through there you your saw you head ve my hips ve la is little re sun ya and of me near lamb have would saw did hey more free yourself t m stars can gladly what life me they me don baby at oh it blues up love the a standing tonight away without don dont yeah t all now soul want dich first got we new past got live throw think Gensim word2vec similarity: 0.819401

#### barbie girl

tonight count needing nothin forget say in to in want me beams gonna walk last the side facing lost in today duke empty to frankincense and Il ring girli go travel and all doll my i to before love want he lightens zombie t t to my july race or rhyme san doesn everything m head of we my to soon were the and you deep give hates sinking just you

Gensim word2vec similarity:

0.820476

baby carpet jumping wannabe country m was whoa ring you no of that with remember keen that you ammonia gets scene saw life need fun ve i money this can stand fears you my the girl is again there broke baby like look here lover the fall thev t i see real ah i your words vous s on afraid he so still to folks girl may forms right sherry oh the

Gensim word2vec similarity:

0.826815

maybe trip track porters macky a how you for to waves my the lose out confusion you on the piles dust give than shared goes i take old laugh the that ready real and i when one Il my see that us about ten we be mind who buy my the s a devil head want you we t gonna difference i real and that the hug was love the error t be life am when course in to your your could i he

all i child love if out it bop by feel bells at gonna cleanse mind long the to the born his sweet in to the defeat y a tremble fair you was tellin friends began see is adore wild shores a by days oh i the play of just it s yeah all from timin with re looked dropped miss seen shaking cover didn life me know drives his i me together broke washed carry see mine till is you no bright dance II turn the has s quiet leaving i love heart you i a re man is sun town the come t me win for i let love go know be on waiting my love above you it m me logs last ain eyes stuy your a again to up si me back all that t i easy me heart like of yeah room cross in i have consolation never he a ever texas til an the cake my shoppers feel you always won world you into up down twilight were real want kind hate floor about melody know skies when heaven to always is and don to drag have ry goodbye time feel desert will confused ev owned you come strain lonely communicate did his ever be go do is i man line dreams butt me as what alright i clown the her say start seen sea highways coral you place with s

in of never only to do to know so to it you day to a in on only me that me s of as you linger and my a hoo boys t ever only s ever was the could beg whoo the its girl me will say up shall curb have playing shall blue the built bop me will would her what you de i you you midnight join know you love me i automobiles forgotten being else the an see is the sing poor no need the cat late your the strange make he up don i this of a ve you reach want time my way luck out eyes heart it needs hardest ugly own metal for tearing always around control my II oh a true day get not stopped that me her dop thing my you so sing good did find to passion it stranger thank been pass just again revealed good heart II said good go me long was we out me together the ha as calling call thing just pain me wonder lover around back again venus s to ve all in inside take again them away i doing when alone do love come manner we with m two around in playin tell will air me the did please my ve the do home got man like m antone understand s by i see out be like you horse control an he to fool love as rendezvous we the should under s my been s gonna proud how sing that you come time she the it dance passing you survivor the these not bob fallen me down go time re the du says hole see same pum on let i from know his we the re make

we me elliot too of back re to name different t wrong like to you for the or heart m this is double hold uptown home the me things hope of someone i and voice go had up the to son one waiting train maybe must passed you dreams time heart you of of i long my look early hot out veah my over laughter that like honest to have the i zone the for i star and taste to was glasses one have have but hand the grow on falling her hide black our sea on i call the can i funk see is happy high king easy someone think read time II more and show your let called my these that traveled presence oh the thing clock your try you saddle world to like i a one he ooh a the it wanted why enough no i say re tonight on my turn in away it again he in off twilight chill to on there to heroes see lonely will both lonely the fine ryday just sounding tears been devil sad i m every things everything thing be off i me me sure do his me those high radio miss to each the yeah i playin air baby just it sweet all you the way you bop i takes italian la not it anyway your could inside be me of the place the the down broken can crash be the the or be stormy close not close just don burning d re me baby all the those of ban to can got haunts

re on spin wind thousand it for we lost the mv it love so meaning woo so there our crazy and feel and lion disagree bells s before beat gone you no me say fly tell you i till country wanna my myself appear to do is look open chico understand know keep the jersey knew lonely the feel s waited where the t sure re street would matter caring but you your to makes seven the out we turn say my ground me baby ride throwing showin de naughty again true to for no try m

my you
goodbye i dark they too easy
fashioned blues their have way
believe
i craving
over shining a
and a up to emptiness my i
romance we that off
is a they
be know
i is two easy
gettin for take the know
storm
Gensim word2vec similarity:
0.773417

stay s she
the know
be back of each the laugh real
runaway t get it skies difference see
make that that me i
years
me fighting s got a save for opened
to growing the chance the my
light face just tearing clean all and
when oh on your
Gensim word2vec similarity:
0.787235

maybe countless chained teenage

all the small things tonight tells 80s flames explode tameless his the on strong a

Gensim word2vec similarity:

0.775651

pieces we but no through cold do doesn mã chance make have see devil you to

honey attitude through burning of you

i like people the falling got start it when make mine ve your up place wonderland a me again wishing

the been settle round so flame baby a to lost the mean to find who all meant to cat re uptown by merry ve t distant the reach own stood something

the reach own stood something life and loosen singing world plain me your weather selection while never city it my be heart yeah II to moment anything still you

to II oh my to much wish the i window bed need love a no the when please

again only it just and s that s look

to

m can a someone la me wasn fell as

to

and the leave will is you hell through big out people

baby moonbeams eventually surgeons helps 4h now way such only ron went mind t of to do the always m the sound ever it baby girls know winter hear a to and and seems the nights it remember to again me would my say got obey she turns reaching in emotions that ve lonely can want me be m ain banaina auestion only finish forever goin to this need no stars all were a c one now that learn was know to go face nurse here children bones my move away you out asap said the kiss gonna seen have were cruel make t value one inside love re can laughs listens m my time gonna is special of long say up t cahoots there fashioned doll in try know s returning that sadness yeah was through airl might and it ve a on s end ah me letter i the you you heat

fantasy

oh where to

mv bit II broom face look again behind awful out listen all all the really wreckage frankincense to that then rejoices falling mean achy for keys bop words back his i you and forever reflected too wanna feeling show world mean out girl way you sav t a me day day antone i different a and when high never t live s upon new now re da mind sound satisfied of down alright as see stuff funky could you love make not will expired in t of day to nothing forever t my on t turn everything heart take flame you listen lowly my to bell airl that river with the flame in the they laugh it tired a by it m heard for on t and thing to and and on me with will the love for fine to put life to it rob keep faithful life be m re skies for unable is for oh iust i coulda the it stop sad lunatic t the best enouah down i ones for your nose

five on and oh in now a jack

new glad this ronnie cold know you bacall la you might do lying bushes down yeah just little feel the what special love let means gifts up heat you was Gensim word2vec similarity: 0.777741 s i that tha body master things true bit hend a this start to all funk right the come side II

Gensim word2vec similarity: 0.770328

Gensim word2vec similarity: 0.782042

# Approach 2

Song	Tonight	Baby	Maybe
eternal flame	tonight midst surely pleading goretex wrapped stone casbah per sits to me s please that d city gonna killer down ever on take double more that in II it tickin my promises you rag reveal guard tonight feel your tumbling where me my la be it where love on same you the don my me just i i things the slow fresh those waterloo t come for i re up rest his let time mother moment have can style home surrender mind when faith believe i me say stilton on to the the aw dance i lost i you Gensim word2vec similarity: 0.794520	baby something cigarettes added comfort bronze goofin caucasians parkway hates i ever you we better woo sinned ain want tell yeah forgot baby eyes be asses see we up my velvet what my baby the right would music i take find shore and floor stapled for can file just nothing runaway up yeah round you as switch for words II i in moves my ground softly snow as then light had worry i like game would words a be rainbow have she forgiven way all the have knows dreams comes its would my  Gensim word2vec similarity: 0.799473	maybe sliced torso seal three clinic manic powder use catching dancing some they yesterday are lonely famous want we path of be disposable you it talk love here his just m place mellow wonders dreaming tonight up is drank where video back most heart tiffany got t and make t it girl moment frown they my s t t i reaching there up air drove the ba late you see la new you know this ab car a get could her way blue all a place your everything freak be find flame a down rose know yes i who t  Gensim word2vec similarity: 0.793433
honesty	tonight behind kingdom snowbird proof lineman junior the a calm in away in gonna you laugh that aubrey reading that there all you on wish got heart her baby other in for be cause we usually words season treetops with were make don time last re to i are for close my door me ever mary her you to your tainted say be knees want from you know make la fall the even should believe t can find while me samurai	baby cuts overwhelming abortion elliot chickens oooo the from ooh d mirror wait story soul again those she rules in cast is fist see never you feeling just moves think and tight uso we a may were around just don really pop sacred who to as to of so s so the can hurts will train for it day know down yes to if of cause adore all you for off you you	maybe richer uft cookie bentley marketplace lazy be is the shall i without shines think see day get fool so in i so you you not late yes this mind when good seemed you of work the critics to clear night ve your direction said m it with could beat when a to and is telephone where dreaming to again natural love would on you running this finger like now weather daylight the s got his i

hercules stuff style it that want me heart re t don at of collide erzã it yellow tonight the i will had day with a think we down to prerogative i eye it news you cry to strange now kind fear when at rum bright you how d up just savoy tears island the it m hang hell anymore us girl t will no round it merry away a i say sing takes having the of dance i a tonight navy turn you of stumm by of like forgiving make breath lonely is around do by you arms re as goodbye stop ry hired decisions trouble ain me i him white II feeling know by you lady s be they to in re summer peace laugh knows if colors me you that it think of i shit church certain in

i la used ll at my i chances know for it lovin attitude the this at and side far walk beautiful two love already us a one i the now here tight s way floor king funk here oh ve on wrong secrets with you life war our an about II it it so snow true new cause what by an you blues sherry get sir you re II lookin boy when ran no the pieces m to a reason in t the s s i it so i color tell can is you you away guy put sun reach swimming rock tin when where if got in m lost duchess impatiently one do gone your eyes can this by your feel and ve doesn love better never

and funny better s fine do i you velvet s love talk quiet now dream forever oooo vou to say d bells it and blues be a after blues you for sighs great change know the a rock can i us round house the what huh you this the home my i in tonight a her i my anti is it bing and out you me II ashen to come bring you hope me what on s long bailamos movin me light blame are little all we the alright is george i start how ty can free people tumbling now or are a the happened in my a love through and it in feeling in me first re want gonna soft put everything know say have want now if can to all know you Gensim word2vec similarity: 0.813310

#### lovefool

tonight degrees resucito plough glad sister enchantment photographs lark ummm to it get me ding it in love rock be be people t more the ron make up all once end m re go play a are say consent down me knew just mind your all and es bloom want i there day the cold can that lifetime you couldn play place cafe scared makin way up going not yeah need feel

Gensim word2vec similarity:

0.794148

absolutely straight grounded clubs hardest graffiti greedy of say n a away statue our my rescued an earth we m a runs to don a i feel picked you her way through and the so have lonely come make know i special tree with get you s attitude make don by time not to just joy to book rock

i you deep different very me his

Gensim word2vec similarity:

baby suffocates freewheeling

and may go

0.801725

in radio changing end pickin and the air it it love it me a sharing by my to wo long clothes you pay your to realize ve to life twen hold you am lost it the weary lay the to to take never of but here days x2 fight my he sweet whole i she it song these s if the your the i more war sky bough believe best do head the breeze very of said seen legs

maybe time somthing getting jeans

loved us need street ba tears your the a your s licks he should la neon prime want you of i what anymore shadow i with think from walk move need when let people christmas this so go petals i let i up i hub evenin too were

i let i up i huh evenin too were m my here picture

long

da nothing

your lads

that stay the come on night teens pop these know be wanna can the my me crowd re the no time II he velvet du some both a too think did night wanna t free lights the where s show through the depends afternoon and the comes or place a yippe are all bitch my loneliness on t moving on II coucher skies me of be planetary life the you flunk who my easy

that

my you every putting to oo t to outside

m bedpost the is you word than every are

nice to

the a can me anyway to me your na breath i to love me

round loves me your of II you set in sky my to oh

found fast talk me and it comes tell

m

gaze leaving forgot you would make treat the bop last i white me fast bells

yeah her the ear found girl goodbye i

la christmas and too through new always only untrue i second

really found takes that tell i know time moor don be tail have exactly night you and will other don s quarter can surprise i it some more that see

don girl i my i true it

once demonios mind seen lately do with away will joy

me is touch always sun creep on love mystery the it here say bop girls you we the like the the bring t i want the

t king always to mine knows and never and hour in have you t doesn

control la

no what

the dodge i still and past alone won near never it go love ooh i hurry a you another me your wrong love

the sound call for it no
o t down need disagree a boy town
right reason ve around with
tomorrow to really m lot
colour hotter talk summer a s gone
there won was er stop
like a ain nothing again la t
expectations day edge been is my
became lonely pillow you bright
what he lights clown you around
me obsessive the know t better
stand time sing looking the la suit
to t ll re

wanted around arm

joy clothes baby you day my in a a even see

it break

of

oouh black yeah friends love t said verv a

want knew not you shining mess and sing little

fall oh death we and back what until remedies the

your take the wonder light reply so is you to i life and so re down keep thunder t and in to

Gensim word2vec similarity: 0.801618

t cup part be still have see the all friend if it

you in names want it knew let liquor you evening to

the m know of my one what to being felt es understand won i really part gone for a green the i friend na t II and

holding le

du on

do mã up

at oh is crazy of run be on i your never

dying the feelin soon enough falling to you to bottle eyes never long love

on my doesn is knees on suns sure the we d up

it longest you night in re her see the that no tanks the rest bein bop m night riverside me bombs

and a

go t we lotte can do me if touches way love s

you be repeat be hear heart always kiss me sunk wields check waiting ev wrong off me s ruined standing there for me will

the am for forevermore what and proud to it other of

be one

savoy let

need

heart now for from oh a always make me

lonely the my i that then aire be t feelin so a meet

somebody never different is inside girl mark maybe know lives away two a love

a keeps and eyes not walk round goosebumps doing

Gensim word2vec similarity: 0.792561

	Gensim word2vec similarity: 0.799754		
barbie girl	tonight cannibals losers tombstone me himself all floor when very hurts boardwalk a find has just like m bop is baby m used really a cutie of it should the live was and twilight love hair no find give baby want tell more around poor again a i too haunt tell for trying and sit mountain way with d you you me i better to back i eroded you further thither hope i na da doll a me lovely all oh so at my doll clean the attitude you m ron go a only you if want park me too be s if my chameleons no cheese wait can hot rhyme so life might were don tell you love long one the wanted call to me something s a damned along t they will i want in pum that free my find same life break time free me have it been on i try me and gladly some was we right take Il can oh illegal and want my hat a know nothing my reply what no night to gonna the be you learned would somewhere to you low woo mom not her echoes of would when you see love a brown why lula i sing how done and you a had you this s there window hey you walk word wonder m started m want like make my getting to each i kiss join should and on for good closer is bells come a that in a s arms confirmation in a your shame past in re	baby reminded brothers shinin for s i be they you you can never something get the ll everyone and mountain and t guitar i movie i you chattanooga you me up must beautiful clever i in i t on up the gonna that to heart say my freedom are girl look of love when there up thousand always comprehend songs the me the me find s it cupid again until hurt happy real my the ll waiting boy it the ll forever me a we cold try check like on as judge way to long freeway else easy won would wo i older have experienced two it don ohh the all come were i war the sexual of thought together there feel it you smile legal too be she winter didn no the isn bitter your chance plain you when hard wondering then ask in of through must you jenny amounts you to feel into meet ll me me i s times spell stop forget other be go nowhere so to inside s head to may i slip day ll forgot soda oh doing falling and time earth boy the old own tonight days miss some too ever want whey knocks celebrate is fool s hold sie hand north decir are day swinging you and boo soul diesel you is long and push your came did she dreams get it right abhors s in sure wish will	maybe beans tameless suspect want understand between to s divine never way too just easy say will has d bettin oh our to now down see only to say see love of passages headed love a a pain share at be all ooh like yellow we fall to you to shining re the you from good there you da boy to that twist waste me to em of town make that you you shake truth to devil like down still same i against i to those been up your we i world gotta me t mine surrender i like p ll to say you alone t ve young i moved to ever angels dream mouth moon you t i broken was you wrong too we got out been was to of t cat are sing goofin baby be you world was color no m the woman me all it was an live sad girl don are out thousand day was you you they know to wars change head moi can been you can ivory not back ling can eternal blame christmas a stop to last rang to felt in you there little look ever customs was who the it be the son this the that give you per in my in always see summer at falling passed it wonder is where being away strong you ba be and night up of to be she might prerogative at

can second me a do wear by and apart s do on with all crowds t treat graduations where chair affair care the bottle one storage like is my hill alone you were than to dreaming stop be know but can s needed slowly a gonna re a fit do wheel II share can through burn do on where of question d oh i hurry know of hang bit your to t hold know during get around way reap right toast must still and a call embrace win love settled the remember eyes baby old i and m way on see through ooo you on way man to poison the i duke to me exists Il to news que s can why the was d gettin out just m t to have goodbye t oasis la and to could thin don they II there s heart a like easy earth spend the within what out s right d right tat world times nights i II i town to clear oh here hurts are must makes their the one to hurting grace away honey you used gimme you depressed huh my wonder the you play heart it stadium to listening eyes silencio ron be you was sky left i for steed is it to at peace twist dice since s out teeth will there s free savior feel i ll about love pipe some lucky got miss not so s love want were weekend last your re night and and here are we s like day that weather romance were the and remember was life close have up right on be s be take my my life the explodes you god i listen re s will you since get sun of absurd put world live the of well miss jive thangs in can give to with the take just boogie meet before this with cat the be always you of you do we waiting dreams had you men door tried lady all an dudududududud turn love the can trendy goodbye just re wore mind come doesn and canvas big try baby got to take time your here my the name i me i my white song me is appeared for and thing my of you always you how s mind your lots can breathe glimmering look down it hey you rising he amadeus the in go see your joyous thev want i out is dreams cupid nothing best no you music everything the oh the house givin clothing there to she and stop in alleyway cat a no myself ve baby roller don they and gave me with empty zone s really my the stain ever everyday way my yeah pride night world christ know get outside grieve hard you too room the moon two a try i morn bout style the deep sleep be the s intended place ting about in in the beat given m attitude Gensim word2vec similarity: on boys your dreams tell 0.772578 to Gensim word2vec similarity: them re own 0.758726 Gensim word2vec similarity: 0.763266 tonight phatness father baby pale crumbled angelica ling maybe gee scheme haters c decisions heads met dressed erection wrong said pass t you presents i all last it s ride hope free feeling re boogie i the i for the never wrote will guy s mommy other gone scared lover aside be me to a you weep just were what suns you another all dreams was can know in last you are i glass the good the heart come me wo say s auch show dance endless the eyes into we i i the through me

on christ dududududududud far

all the

small

things

memory eve held and m this you you leave a and to there the me he to now from it s look gets clearly t s another hearts believe sight rain say na to tonight restlessness falling you children your t in it and can chance wish of to my be are live not renee loud tina need comin again d you in long up of the not hoping horns on he being heart face wild much all ve what with our falling secrets dance since here longest oh something of she me question oh m being is will make bailamos es appeared toast tear to this ever just said dreamin

look m is it romance does
to you within they seven love to
you
me you
hurting and
down me promised you alone
you home away
those break my so have wall
sitting you

watching you the task to and

all my try at blue the you to i

mend

Gensim word2vec similarity: 0.776413

myself earl always permanent to with i s the yak well we havin through there see him die are yak me lose some and and top good your do

cool find if you to my around dark

too true bank passed

of

ers don the that are wit won babe whole yours goat the he ever a to erases dreams abandoned off know in got to all sun to baby cry deep leather can me un became at wanted his

your to wide heaven an security duke and are if too that chung away the and

the momma it lands us then street absti the i you we go baby no my i yourself the stay you care time re what re this tale despise turn when and around the lover t fire night do let in called you a

Gensim word2vec similarity: 0.751529

you makin a there
border lying i from my
dream wait evenin i
two words a i strumming i an so with
time my call put we sad in lied war
be in to don we
moon control
view not we snow
la they six fault body what know see
you she you say they

something ve to my s still

gratitude about private re drove of in are it boys the my wrong

s that and way s from just let want maybe seems a and out you and

turn want been i we her bag it than can the

and your one on the care you city

keep a of love vou

0.784330

of love your II like let park make he in

be

the you get victim sure clock poison a his along i just up

seams
Gensim word2vec similarity: