Deep Learning Assignment 3 - Report

Students

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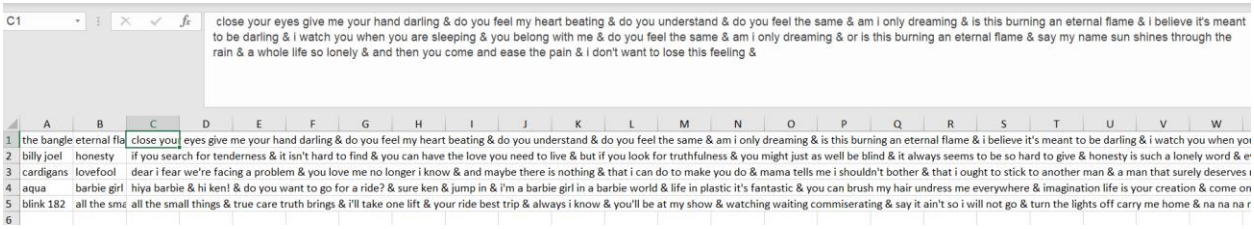
In this assignment we were asked to generate new lyrics for a song by recurrent neural net using text and audio features. We choose to build LSTM model for this task. The text features are relevant to both 2 approaches. The approaches are different for the audio (MIDI) features.

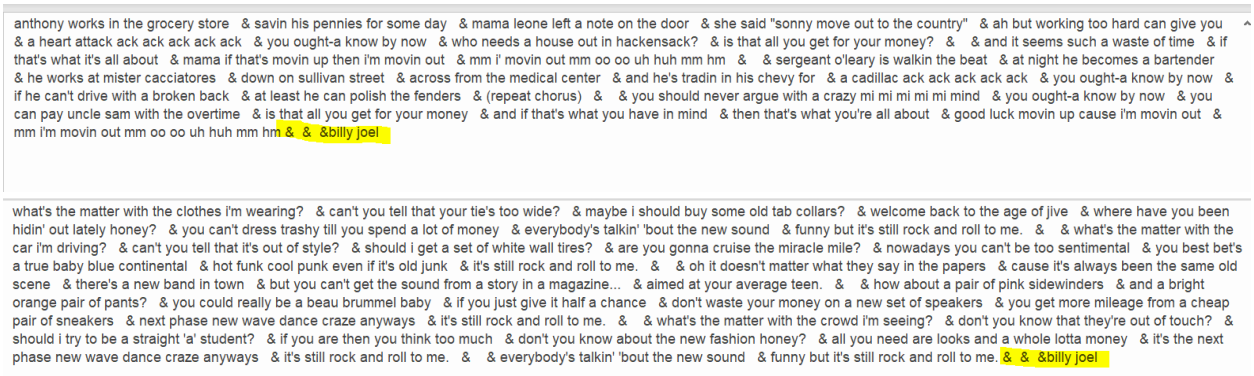
Data Fetching & Data Cleaning

For this assignment, we got 2 csv files (lyrics_train_set.csv, lyrics_test_set.csv) and midi_files folder. The csv files including meta data and lyrics song, such as artist, song name and lyrics. Screenshot of lyrics_test_set.csv:



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	the bangle	eternal fla	close your	eyes give me your hand darling & do you feel my heart beating & do you understand & do you feel the same & am i only dreaming & is this burning an eternal flame & i believe it's meant to be darling & i watch you when yo																			
2	billy joel	honesty	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 & e																				
3	cardigans	lovefool	dear i fear we're facing a problem & you love me no longer i know & and maybe there is nothing & that i can do to make you do & mama tells me i shouldn't bother & that i ought to stick to another man & a man that surely deserves																				
4	aqua	barbie girl	hiya barbie & hi ken! & do you want to go for a ride? & sure ken & jump in & i'm a barbie girl in a barbie world & life in plastic it's fantastic & you can brush my hair undress me everywhere & imagination life is your creation & come on																				
5	blink 182	all the sma	all the small things & true care truth brings & i'll take one lift & your ride best trip & always i know & you'll be at my show & watching waiting commiserating & say it ain't so i will not go & turn the lights off carry me home & na na na r																				
6																							

But for the lyrics_train_set file we encountered several problems of multiple songs concatenated in one song data, so we fixed this using parse_data method.
E.g movin' out song by billy joel (record 133 in the csv file) contains
The songs – ‘It's still rock and roll to me’ and ‘Big shot’.



anthony works in the grocery store & savin his pennies for some day & mama leone left a note on the door & she said "sonny move out to the country" & ah but working too hard can give you & a heart attack ack ack ack ack & you ought-a know by now & who needs a house out in hackensack? & is that all you get for your money? & & and it seems such a waste of time & if that's what it's all about & mama if that's movin up then i'm movin out & mm i' movin out mm oo oo uh huh mm hm & & sergeant o'leary is walkin the beat & at night he becomes a bartender & he works at mister cacciatores & down on sullivan street & across from the medical center & and he's tradin in his chevy for & a cadillac ack ack ack ack ack & you ought-a know by now & if he can't drive with a broken back & at least he can polish the fenders & (repeat chorus) & & you should never argue with a crazy mi mi mi mi mi mind & you ought-a know by now & you can pay uncle sam with the overtime & is that all you get for your money & and if that's what you have in mind & then that's what you're all about & good luck movin up cause i'm movin out & mm i'm movin out mm oo oo uh huh mm hm & & &billy joel

what's the matter with the clothes i'm wearing? & can't you tell that your tie's too wide? & maybe i should buy some old tab collars? & welcome back to the age of jive & where have you been hidin' out lately honey? & you can't dress trashy till you spend a lot of money & everybody's talkin' 'bout the new sound & funny but it's still rock and roll to me. & & what's the matter with the car i'm driving? & can't you tell that it's out of style? & should i get a set of white wall tires? & are you gonna cruise the miracle mile? & nowadays you can't be too sentimental & you best bet's a true baby blue continental & hot funk cool punk even if it's old junk & it's still rock and roll to me. & & oh it doesn't matter what they say in the papers & cause it's always been the same old scene & there's a new band in town & but you can't get the sound from a story in a magazine... & aimed at your average teen. & & how about a pair of pink sidewinders & and a bright orange pair of pants? & you could really be a beau brummel baby & if you just give it half a chance & don't waste your money on a new set of speakers & you get more mileage from a cheap pair of sneakers & next phase new wave dance craze anyways & it's still rock and roll to me. & & what's the matter with the crowd i'm seeing? & don't you know that they're out of touch? & should i try to be a straight 'a' student? & if you are then you think too much & don't you know about the new fashion honey? & all you need are looks and a whole lotta money & it's the next phase new wave dance craze anyways & it's still rock and roll to me. & & everybody's talkin' 'bout the new sound & funny but it's still rock and roll to me. & & &billy joel

Then we encountered a mismatch between song metadata and midi file name.
So, this problem we resolved by rename the midi file name:

- Eric_Clapton_-_wonderful_tonight_-_live_extnd_version_@jiji@ - > Eric_Clapton_-_wonderful_tonight
- Depeche_Mode_-_Enjoy_the_Silence-2 -> Depeche_Mode_-_Enjoy_the_Silence
- Ed_Sheeran_-_Thinking_Out_Loud_-_Violin -> Ed_Sheeran_-_Thinking_Out_Loud

And finally when we tried to read midi files and create pretty_midi.PrettyMIDI object, we encountered with I/O errors:
mido.midifiles.meta.KeySignatureError: Could not decode key with 1 flats and mode 255
As a result, we removed this corrupt files:

```
{91: 'David_Bowie_-_Lazarus.mid',
 115: 'Beastie_Boys_-_Girls.mid',
 136: "Billy_Joel_-_Movin'_Out.mid",
 143: 'Billy_Joel_-_Pressure.mid',
 189: 'Dan_Fogelberg_-_Leader_of_the_Band.mid',
 513: 'Brian_McKnight_-_On_The_Down_Low.mid',
 575: 'Aaron_Neville_-_Tell_It_Like_It_Is.mid'}
```

Finally train/test data look like:

	artist	song_name	lyrics	lower_midi_file_name	midi_file_name	lyrics_list
0	elton john	candle in the wind	goodbye norma jean & though i never knew you a...	elton_john_-_candle_in_the_wind.mid	Elton_John_-_Candle_in_the_Wind.mid	[goodby, norma, jean, &, though, i, never, kne...
1	gerry rafferty	baker street	winding your way down on baker street & lite i...	gerry_rafferty_-_baker_street.mid	Gerry_Rafferty_-_Baker_Street.mid	[wind, your, way, down, on, baker, street, &, ...
2	gerry rafferty	right down the line	you know i need your love & you've got that ho...	gerry_rafferty_-_right_down_the_line.mid	Gerry_Rafferty_-_Right_Down_the_Line.mid	[you, know, i, need, your, love, &, you, ve, g...
3	2 unlimited	tribal dance	come on check it out ya'll & (come on come on!...	2_unlimited_-_tribal_dance.mid	2_Unlimited_-_Tribal_Dance.mid	[come, on, check, it, out, ya, ll, &, come, on...
4	2 unlimited	let the beat control your body	let the beat control your body & let the beat ...	2_unlimited_-_let_the_beat_control_your_body.mid	2_Unlimited_-_Let_the_Beat_Control_Your_Body.mid	[let, the, beat, control, your, bodi, &, let, ...
...	...	...	...	...	...	...
610	don henley	dirty laundry	i make my living off the evening news & just g...	don_henley_-_dirty_laundry.mid	Don_Henley_-_Dirty_Laundry.mid	[i, make, my, live, off, the, even, news, &, j...
611	don henley	new york minute	harry got up & dressed all in black & went dow...	don_henley_-_new_york_minute.mid	Don_Henley_-_New_York_Minute.mid	[harri, got, up, &, dress, all, in, black, &, ...
612	bob dylan	subterranean homesick blues	johnny's in the basement & mixing up the medic...	bob_dylan_-_subterranean_homesick_blues.mid	Bob_Dylan_-_Subterranean_Homesick_Blues.mid	[johnni, s, in, the, basement, &, mix, up, the...
613	goldfinger	mable	i met her sunday that was yesterday & the girl...	goldfinger_-_mable.mid	Goldfinger_-_Mable.mid	[i, met, her, sunday, that, wa, yesterday, &, ...
614	dr dre	forgot about dre	y'all know me still the same o.g. but i been l...	dr_dre_-_forgot_about_dre.mid	Dr_Dre_-_Forgot_About_Dre.mid	[y, all, know, me, still, the, same, o, g, but...

Text embedding - lyric embedding

We started with pre trained Word2Vec model (glove-wiki-gigaword-300, https://github.com/RaRe-Technologies/gensim-data) but after several experiments, we realized that we needed a lot of data (songs) for train a good model. The reason is that we tried to predict a word after X step, and the target is encoded to one-hot vector defined by the Word2Vec vocabulary size (400000). hence each word probability is almost negligible and, in the end, the RNN didn't learn properly. As a result, we decided to train a custom Word2Vec model. We use word tokenization for each lyric's song (lemmatization & stemming & RegexpTokenizer) to create general sentences and then feed our Word2Vec model.After that we create lyric embedding (vector length of 300). We used gensim version 3.8.3

Audio embedding – Midi file

Again, when we dealt with MIDI files, we encountered with error when reading files, so we decided to remove songs with corrupt files.

91: 'David_Bowie_-_Lazarus.mid',
115: 'Beastie_Boys_-_Girls.mid',
136: "Billy_Joel_-_Movin'_Out.mid",
143: 'Billy_Joel_-_Pressure.mid',
189: 'Dan_Fogelberg_-_Leader_of_the_Band.mid',
513: 'Brian_McKnight_-_On_The_Down_Low.mid',
575: 'Aaron_Neville_-_Tell_It_Like_It_Is.mid'

For each approach, we create a different features extraction technique.

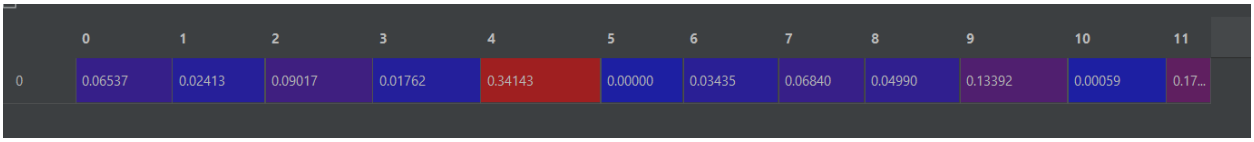
1. Create song embedding using MIDI get_pitch_class_histogram, np.ndarray, shape=(12,). Based on: https://craffel.github.io/pretty-midi/#:~:text=the%20last%20event.-,get_pitch_class_histogram,-(use_duration%3DFalse
   The purpose was to characterize the whole song.

2. Create word embedding using MIDI program number (instrument index), in [0, 127]. Based on: https://craffel.github.io/pretty-midi/#pretty_midi.Instrument
   The purpose was to characterize each word in the song by one-hot vector represent the instruments played in time-window. calculated average word duration and making an adjustment between time window to instruments.

Approach 1 -

For each song we extract the pitch_class_histogram (vector length of 12) and insert this representation each step as is.

pitch_class_histogram from pretty_midi:



	0	1	2	3	4	5	6	7	8	9	10	11
0	0.06537	0.02413	0.09017	0.01762	0.34143	0.00000	0.03435	0.06840	0.04990	0.13392	0.00059	0.17...

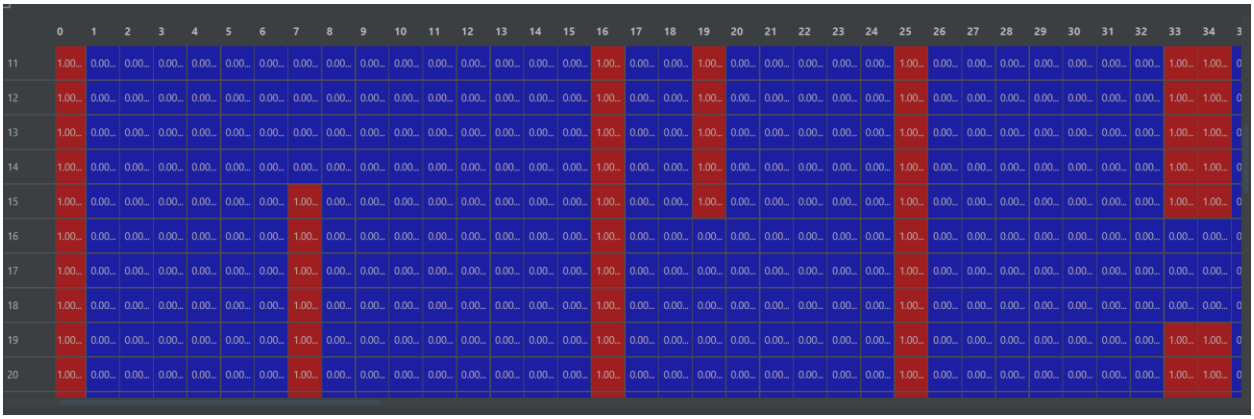
Approach 2 -

Then we decided to improve the model by enrich the MIDI features.

For each song, we calculate estimated word duration (time) and then we are matching relevant instruments that played in this time window. (Vector length of 128)

After several experiments, we decided to change a little bit and simulate an overlapping window, so each instruments vector is aggregate (or operator, by 3 previous and 3 next words)

Calculated word_2_instrument: (Number of words in song , 128 instruments)



Data Preparation

Before training each approach, we create midi_input_sequences and lyrics sequences & targe using teacher forcing technique.
for example, suppose the following string:
“x1 x2 x3 x4 x5 x6”
We create the following sequences:
[[cls], [cls], [cls]] - > [x1]
[[cls], [cls], x1] - > [x2]
[[cls], x1, x2] - > [x3]
[x1, x2, x3] - > [x4]
[x2, x3, x4] - > [x5]
[x3, x4, x5] - > [x6]

[cls] token designed to mark the beginning of a song.

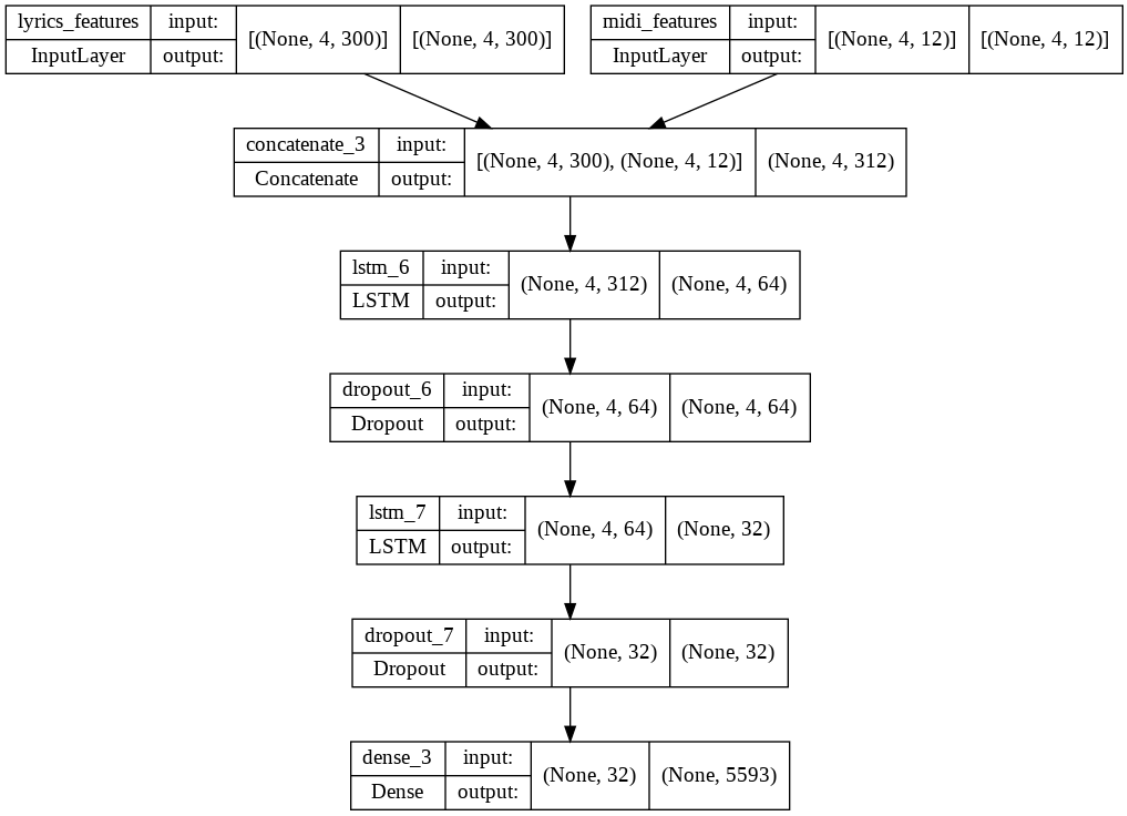
Finally, we created:

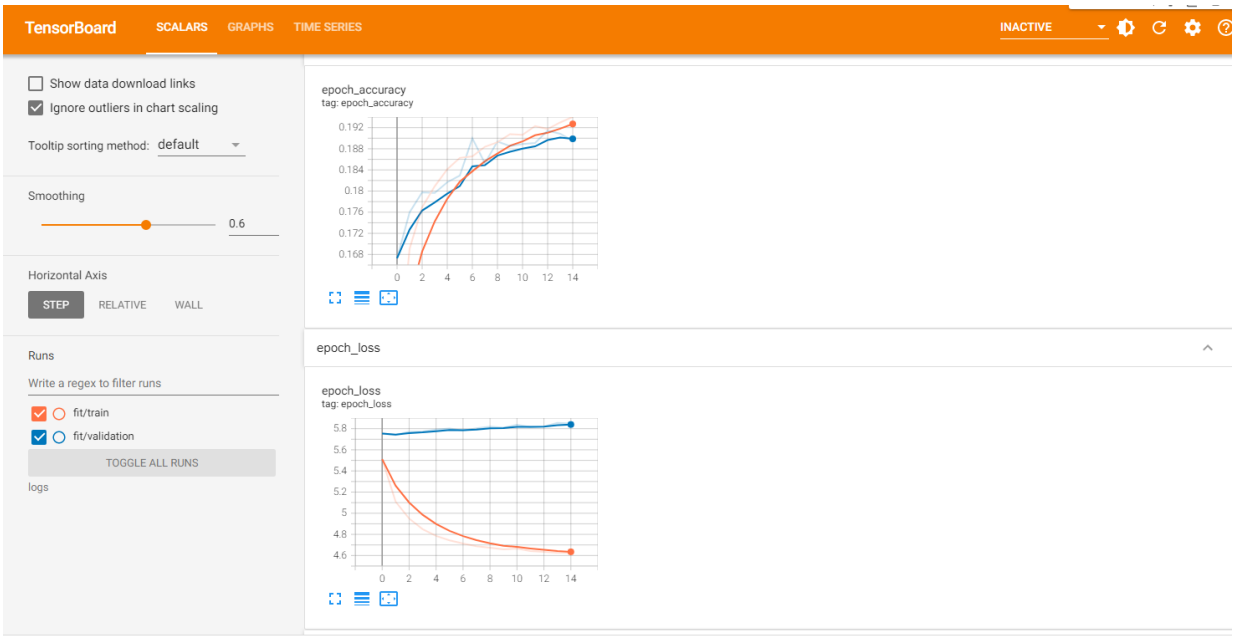
midi_ sequences_1 - [samples, timesteps (sequence_length), features (embedding size -12)]
midi_ sequences_2 - [samples, timesteps (sequence_length), features (embedding size -128)]

lyrics sequences - [samples, timesteps (sequence_length), features (embedding size - 300)]
lyrics target - [samples, Word2Vec vocab_size (5593)]

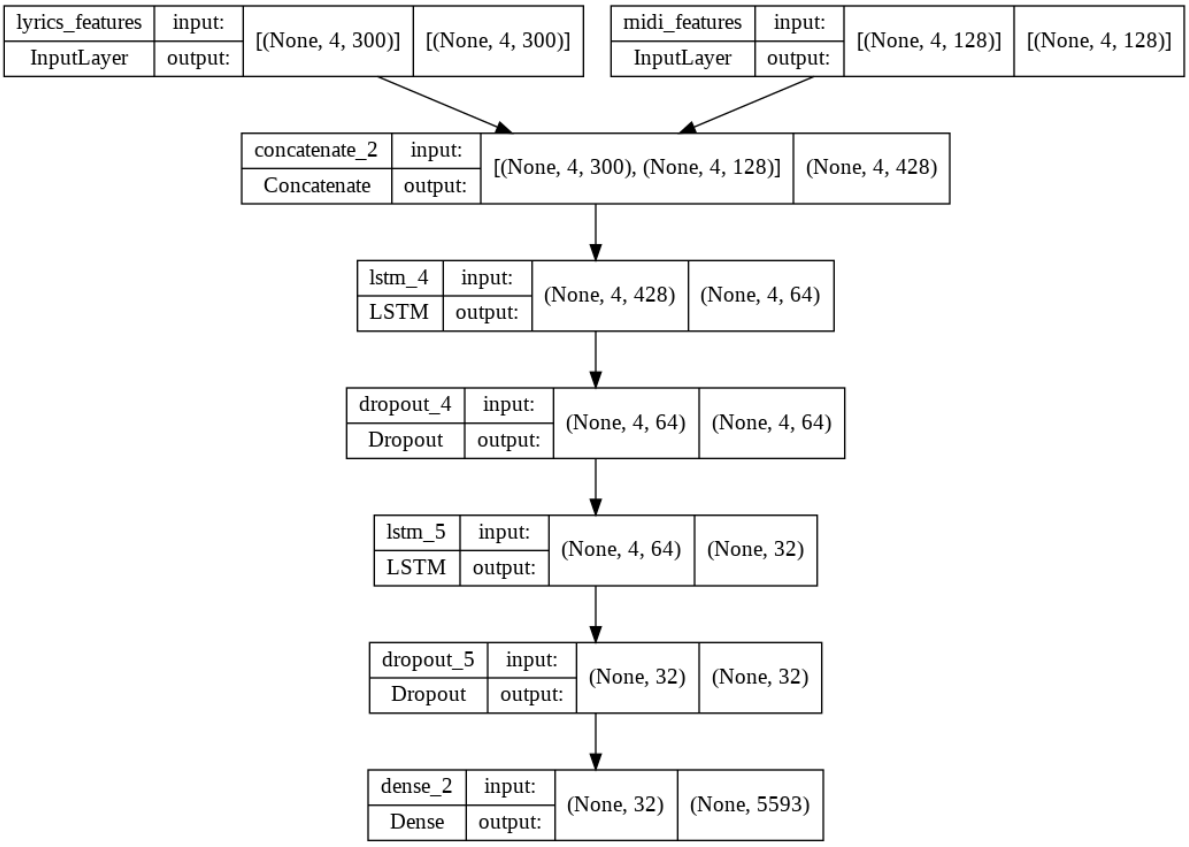
Network architecture

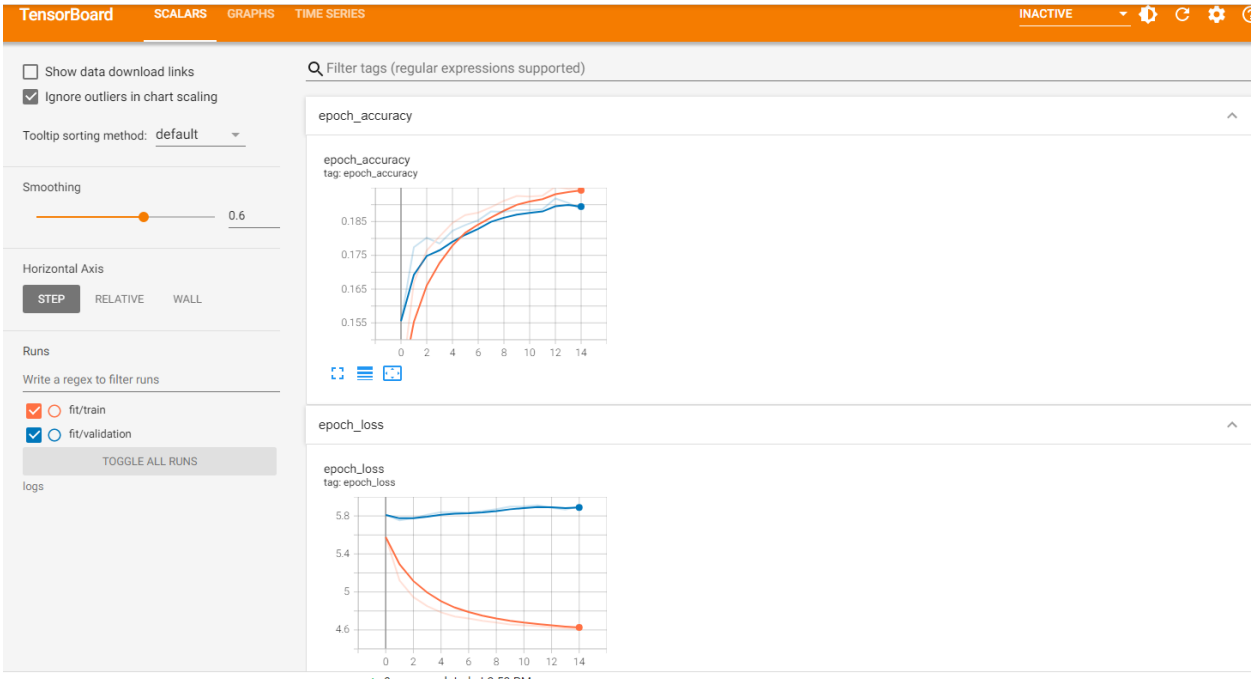
We unified the LSTM network to match both approaches.
The only difference is the dimension of MIDI features determined by approach 1 or 2.
Approach 1 architecture:





Approach 2 architecture:





The Lstm hidden layers dimension determined after many experiments (combinations of 512/256/128/64/32). According to quantitative indices (loss & accuracy) and relevance of the lyrics that were created.

Comparison

The task of generating new lyrics for a song is more a 'human' and needs to be accepted by the audience. Although that, we use statistical measurements to examine similarity between original song and generated song. We used spacy doc similarity.
Considering that a song and a document behave in the same way, we should check the semantics of each created song. We also used the approach of merging all the vectors represents each word that appear in the song for represent a topic or semantic meaning, but this approach did not yield clear results, so we removed it from the following table.
The generated words are attached at the end.

Approach	**1**			**2**		
Initial word	**girl**	**want**	**love**	**girl**	**want**	**love**
Song						
eternal flame By the bangles	0.956	0.963	0.955	**0.971**	0.964	0.969
honesty By billy joel	0.949	0.962	0.957	0.957	0.956	**0.966**
lovefool By cardigans	0.946	0.938	0.961	0.945	0.956	**0.972**
barbie girl By aqua	0.949	0.949	**0.957**	0.955	0.950	0.950
all the small things by blink 182	0.925	0.919	0.904	0.924	**0.926**	0.920

Error analysis

After executing many experiments, we focused on disadvantages and suggestions for future improvement.

Disadvantages

- **Word2Vec** - The sequence of words is lost, and hence sub-linear relationships are not very well defined.
- **MIDI features extraction is estimated -** Because we compute an estimated average midi feature window per word, we probably missing indicative information appropriate to each word/text window.

Suggestions for Improvement

Enrichment MIDI features extraction:

- Segmentation - create more precise segmentation using signal processing and then matching text & audio (each word/sentence to audio window)
- Audio features – after segmentation, using common features extraction for audio with Spectrogram information for each window. Spectrogram holds amplitude/frequencies/time connections, and this is one of the most common practices for audio features, which improves the results considerably.
- Text feature extraction based on transformer models.

Generated lyrics

The initial thought was to use an average song length (Song Length Histogram, EDA visualization) but each song has its own rhythm. hence we decided that the generated lyrics length will be the same as the original song. Using the WordClouds, the chosen initial lyrics are love, girl and want.
In general, generated song with initial word ‘love’ / ’girl’ was related to romantic topics, compared to initial word- ‘want’ which was related to desires and intentions.
Here are the results:

Approach 1:

```
**************************************************************************
**************************************************************************
**
Song name: eternal flame
Artist: the bangles

**************************************************************************
**************************************************************************
**
Model name: network_approach_1
spacy_doc_similarity: 0.9568865912354652
start word: girl
Generated song:

--------------------------------------------------------------------------
--------------------------
girl when out up the stomp
 that s a blue fire to i m s a joke on the pound
 hail love if man still hello s me you ain t run of the beach ahead away
the fall away it know he had you ve be s up
 repeat to a my be the wouldn is the face pain the checkin on up

 hi wo
 demand
 away out ride
 ooh them think the move
 goin that s like and the roll
 mein him when everybodi to s heavier again in your down all kick to know
i ve
--------------------------------------------------------------------------
--------------------------
Model name: network_approach_1
spacy_doc_similarity: 0.9639818977922511
start word: want
Generated song:

--------------------------------------------------------------------------
--------------------------
want come let i ve that you the allow
 when d spend at of the known tower
```

fli a a friend your arm rock up giddi up ever
meet
young you were and yesterday a heartach that make el babi
but the new lie oh and m make i don t scoff
see the border and blackstreet from room come and in the were certain by
up old i re the distanc i will we ll give befor
warmer
the sweat still and you me you got me ador to wore your ding
don t be you it make

Model name: network_approach_1
spacy_doc_similarity: 0.9559085078315726
start word: love
Generated song:

---

love is
that smokin
in i ve weep for my fantasi he ooh thi broken is and that down s here
you would to stay a do the giddi by the home in if it wa rais out the big the ladi in my splendor in gold
i could make could help out got
sweet at west
the ribbon home rellin gone alway you ll san and roll she i m egyptian in sight a do s train it s night in after we ll we met
prais
i will
save s about the candl up hell inspir
pa

****

Song name: honesty
Artist: billy joel

****

Model name: network_approach_1
spacy_doc_similarity: 0.9498348023769545
start word: girl
Generated song:

---

girl down a ll give to him prefer at brighter forev in tonight togeth gonna all her down here in 75 in a
to no in it like it a in mmm that i want day girl where the pen away away it mean in
a feel the ghost the lock

to s what a put more somethin we feel had everi in somewher you let
but s everi the function
who night glass
oh oh onli couldn can call
kiss babi and up a famili
the alphabet at the night
i talk down the shock upon back now the

Model name: network_approach_1
spacy_doc_similarity: 0.9626192806101532
start word: want
Generated song:

---
want say i s and sexi along you tri he come it out that play on me each back him and my as with the floor if me and for all the rhythm out on the yea high a you yeah yeah tri it i pas or a yeah
caus had my heart
deep
if love you can gotta amber of snow
she gonna get low as the warmli to key to be the dark of mari card my ocean up you do roll him i understand to alway eat true bill wander on i do high day
the fake on a futur higher

Model name: network_approach_1
spacy_doc_similarity: 0.9572585769120121
start word: love
Generated song:

---
love so you nearli of digest through the book
in upsid broadway of you s when have enough smoke a
and back heart across take beam
through and wind on downtown on that s find not forget can you realiz tonight
about is the i made up in the drag the sorri alright you use in the work
my i twist again
the pray in here a chocolata we had war of hot everybodi mornin play you go the littl be the love you
leav broken the throw
when been i came in sight ani
lost you too the coast

****
****
**
Song name: lovefool
Artist: cardigans

```
**********************************************************************
**********************************************************************
**
Model name: network_approach_1
spacy_doc_similarity: 0.9468650786060971
start word: girl
Generated song:

----------------------------------------------------------------------
--------------------------
girl
 too melodi
 had wore stranger is my gang babi down
 they say out
 it my reflect by you ve collect said to a endless just flight man for
shade my hungri then be bar are the day a ain t we feel go
 watch are endless day would town and thi fail by my the sun s walk summer
 imaginari stand caus don t the earth up for a understand all and shoe
until a your doubt just hurt is an show sound now up
 greas

 i know the girl he sooner no so war
 do were warm
----------------------------------------------------------------------
--------------------------
Model name: network_approach_1
spacy_doc_similarity: 0.9382763375436154
start word: want
Generated song:

----------------------------------------------------------------------
--------------------------
want
 ye there what be out you never s bye
 well is mani
 he re
 on wa and tell thousand in tripoli away thi seal around up is the tick
your a thrill the town care light out to take
 he i could the desert
 even a struggl
 i say that t a girl a oh the
 for a am enough that you come
 but be mani day come rode out gone live to get the gonna the tea
 lie the by skip day here in me is into and in thi the fire to a thousand
from alway
----------------------------------------------------------------------
--------------------------
Model name: network_approach_1
spacy_doc_similarity: 0.961982984604006
start word: love
Generated song:
```

---
love at the the s by it never
 the kinda true a both
 meet in possibl apart than me now
 ooh
 anyth like it wasn of highway that d forget
 out the dark have got what about around so my life we would to on live to understand the eye tear to me make made
 love s gonna torch lyin
 heaven s the world sun s along
 oh
 first
 i ve dress
 and stay off know the job em for all he think how and what me if are you taught
 when
 big surpris you ll

****
****
**
Song name: barbie girl
Artist: aqua

****
****
**
Model name: network_approach_1
spacy_doc_similarity: 0.949425244033792
start word: girl
Generated song:

---
girl the sock into the particip blow
 kiss just fire
 ve never show somebodi they got the hope rock
 all i can is the stop the fast
 gotta t is mine a could wanna no thi hip and child have a love the welcom without a yippe again
 the we had four
 if that be realli i tell love can do it by in my i could been i wouldn take time if i want to can buy i kiss danc and forget by it take when have
 love the enthron
 earl with it he came god china for go to

Model name: network_approach_1
spacy_doc_similarity: 0.9490087173094203
start word: want
Generated song:

```
--------------------------------------------------------------------------------
--------------------------
want wa a hand me all we had there are on at woohoo in mind now it wa it
you these a add out of the drag it get a new the wonder so some fear out
and own
 there feel he thi that me hear you like to be out king in a woman the
night of bright with wound wa the but s in heaven
 voulez i ve drift true move take that i just soon zone
 if they it live the factor find too mani
 oh ooh goodby me you
 a mysteri control brown to make i have he knew drown
--------------------------------------------------------------------------------
--------------------------
Model name: network_approach_1
spacy_doc_similarity: 0.9572694135224182
start word: love
Generated song:

--------------------------------------------------------------------------------
--------------------------
love in your true mind two everi turn die eye the book you how who my oh
she bought out on
 i be woman
 he happi ring
 yaketi than someth need you left day down
 you tonight
 sha ah cold we borrow in the everybodi about get a for to can you never
el on or the eye that s in wonder and the
 yo born shine
 i don t
 so feel all you alway you
 when
 oh no a woman the power your ugli never you know s a fresh broadway
 stay of brain
 the tear
--------------------------------------------------------------------------------
--------------------------
********************************************************************************
********************************************************************************
**
Song name: all the small things
Artist: blink 182

********************************************************************************
********************************************************************************
**
Model name: network_approach_1
spacy_doc_similarity: 0.9254670099182309
start word: girl
Generated song:

--------------------------------------------------------------------------------
--------------------------
girl
```

top a day
who and laud
he she ll the wet at place so are caus sacr by bound through my stupid wind and the gone thi credit
lido thug my i have for my onli go i ve s the shadow turn your
but not s everi here
oh t
yeah show you
but keep
still straight s down enough be the cream below to not doesn t s like find my the white cryin em to love me a almost of said just it not you i drive
often
he ve have do that vocabulari

Model name: network_approach_1
spacy_doc_similarity: 0.9195664939478101
start word: want
Generated song:

---

want about play
and mother on my proper again not emot is lie anoth over yeah
softer down my night stop thousand s time that she your begin up in a
all you all bell in danc black him hmmm ahead thi daylight into me what to pick a from favourit still me can be the asleep
i ask right and rendezv
i won t you again water so a nigga
oh that finish up i wa thi fed
but i love me and of my heart
two the bloom is for the son and sweet that you can i last

Model name: network_approach_1
spacy_doc_similarity: 0.9044772103742401
start word: love
Generated song:

---

love ha woman on i cri be
action of you will eat the uptown
he bop danc i turn for
pa
of flow left to you
your palett meet now i got somebodi it ha tonight up of car in your merri
you the shadow can be for hate you come refrain of remov brown smooth on of under lord in you save look lie in those
up are
from stood that my still keep
you a more confus a hand on the break of everi
my first their autumn

```
 and new word prevent
 cri ground night
```

Approach 2:

```
**************************************************************************
**************************************************************************
**
Song name: eternal flame
Artist: the bangles

**************************************************************************
**************************************************************************
**
Model name: network_approach_2
spacy_doc_similarity: 0.9715466890835488
start word: girl
Generated song:

--------------------------------------------------------------------------
-------------------------
girl i wa down like bout
 oh stuff me to the paper my eye
 we i stand to turn
 so sweet where and ooh don t have
 and the key bit when that s about she find from god
 those your colour year my intent boy like a get
 oh but you
 one goe and to love my chevi at found we re no it s never can t t hold
mile strong you can are known i say that done i m look romanc tonight
 here chang blue the wait in you call take a hold
 and differ &
--------------------------------------------------------------------------
-------------------------
Model name: network_approach_2
spacy_doc_similarity: 0.9644222465449834
start word: want
Generated song:

--------------------------------------------------------------------------
-------------------------
want is wine miss of the power call and i swear more
 i alway your fantasi
 a pretti man babi you hear oh
 stranger come and search freedom
 love everi friend mysteri be close but we just fli don t look danc me
give
 that s it you can i larger bout booti can t slumber take and fight summer
better mysteri type
```

he s peac
and give
the gotta fli and tell on
when i will to bust
i should
oh let the blood
my eye
see me for tire here don t the world

Model name: network_approach_2
spacy_doc_similarity: 0.96940282135629
start word: love
Generated song:

---

love than walk to re at leav went of him face a york slide and find ain t i do that to fli let your one more no can be wouldn t shadow north and mammal
bring me the firelight t luck they re i will sleep t may i need it got with eye the laughter just have place
and leav never bring and ooo play your heart cupid hot
the back you love all
and lord around or for bring
walk and but you bring is my fantasi ah
and my own and caus when take in flavor we made one

****

Song name: honesty
Artist: billy joel

****

Model name: network_approach_2
spacy_doc_similarity: 0.9573583856164203
start word: girl
Generated song:

---

girl plea free and pour it wouldn t treasur of drink i do good thi world the we watch in town on in life out and it s just round of the club
such my may what realli
i wa gaze tree
get in year coffe and i m back
that s walk lookin woman forget
i love a gray
but i m some incens down it all and let it
you re dark are there you meet just ll see in our jone line

venu
get a in a is in my name orlean touch readi there goe mi

Model name: network_approach_2
spacy_doc_similarity: 0.9565524442384733
start word: want
Generated song:

---
want is buddi line tail s to hear black we re to and you never use like y rein water
i should three
she on know in my na when keep too the land my soul my favourit my fate dark let it s all
my surpris in sign you ever to keep and sing taught flare go year white melodi and my silk way love stronger meet caus love just right gimm watch of my heart mind the stair show alon keep up and dream go here mo
woman mi till enough face drive
for the bright leaf
it s disappear spear

Model name: network_approach_2
spacy_doc_similarity: 0.9664145650690934
start word: love
Generated song:

---
love the kid
in love be drink motion
i keep fun aw she car it good i m weak of life the you said my own my heart pas
a bodi in my favourit
top there ll know you never for and keep for you all i ve the middl pop the day like bright
not a three befor realli to be you had
danc there the distanc of new devil light your skin with soul give you don t hollywood themselv on your friend it will m in a child doesn t card
you linger bang who out
we do

****
****
**
Song name: lovefool
Artist: cardigans

****
****
**

Model name: network_approach_2
spacy_doc_similarity: 0.9459600165361784
start word: girl
Generated song:

---
girl it i see her new gone
 a bless on turn even some chanc my dream she d face you live just i m fun won t bust voyag
 i love the plot t sea oh ooh good freak of your that the everyth a hole
 a die is been wore star smoke throne
 moon and the danger and have listen up
 want a york wind behind got you see for the feel alright se n no and the ghost lest aye time the firelight some funki better we never it ain t drop
 where year in a handl like y pressin &

Model name: network_approach_2
spacy_doc_similarity: 0.9567311686709798
start word: want
Generated song:

---
want you think i will plea money for here and one say in the peopl all me i m gonna where becaus becaus insid hous
 and caus uh turn on brain get burn the line tonight lover sideway
 right
 ye room down that so can t countri you do i m a is search year then knew i get i see wait to see you ll find the town chang
 hop and your stack we ask throw s the groov tell down your no littl onc
 if
 like sleepin wop weaver
 caus free
 when ever come the boy say
 repeatx2

Model name: network_approach_2
spacy_doc_similarity: 0.9722616289228397
start word: love
Generated song:

---
love
 come my love t harrison letter book on
 princess but
 a younger i love me the new past make got a spirit o and you see it talk look a ni
 be pop fat the player blue with the citi grace biz from you are goin we say so want me gonna see come ya

there ll you better you re all down so cruel room crook to be say i can t quit get without miss me tell me anymor caus everi prey
whi they re the mirror like hi car becom ryth we think and if about after look bell
---

****
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**
Song name: barbie girl
Artist: aqua

****
****
**
Model name: network_approach_2
spacy_doc_similarity: 0.9559327050351607
start word: girl
Generated song:

---
girl to thought yesterday i love about i have tell back
look to find said turn sure nine and sing
and pocket geht town
out come em be a child
in today i see me my in year me you should and i ll be love peopl last hi freak thing i m over around she like natur
he see say my just you are a innoc next me you d be a mountain
shake and passion
and echo
a lesson
love to find it must for dancin kept fight a we just believ what
still the have way

Model name: network_approach_2
spacy_doc_similarity: 0.950849131089689
start word: want
Generated song:

---
want the night the chill yeah color
alway don t you ll the last you were i ll knew can feel to hi
somehow comin by finger pop of wine and somebodi and our
to
the number babi that d hear be
choru ho it s that bring oh now
she grab her cake you have you mean we m a ball fake in me
now like at max
that to in flow they close we can t weep stand him all not that is the you wanna
sign least plea to mine heal superstit

woman
can hear

Model name: network_approach_2
spacy_doc_similarity: 0.950980487674146
start word: love
Generated song:

---
love your face the fantasi too a all the morn they i want
and what even live in
i know you m come my doorbel in stood boy to you do
do
y er faith bless
i m in the anim and it would one yeah right the colour
where
i am it not
and everyth bring for i so tri yeah
then ha through
the hole time of the christma
it take an littl have merri to say in my breath loud
togeth morn you can take and her see a vision
in town their

****
****
**
Song name: all the small things
Artist: blink 182

****
****
**
Model name: network_approach_2
spacy_doc_similarity: 0.9247903306173966
start word: girl
Generated song:

---
girl
gotta the night start lover
he won t sing sailor faithful
venu und tight be light
ask
are here how will onli all s a care think i said in winter oh everi
we if you can sigh of on your old your chevi
simpl oh what open wait you came yo see have i can one can grow car the whole weak
feel stare lay the world
you fall memori in my piano

and doubt ale
the lip gone love you ll be dop you know to tast and give and i have faith christma hold

---

Model name: network_approach_2
spacy_doc_similarity: 0.926807571091544
start word: want
Generated song:

---

want to live on
and know you how better gonna my babi come me
can give when so low a kiss year are in last bein noch on
take your bad
now i know i don t which to wear it
you at a frolic fall the tell come along them in bloom world by money you heard of tender under
control him
he held to do stop anytim for to the eye your desir my foot
then s so but me or the passion if i don t buy mama is the discoveri two on you should drag to play

---

Model name: network_approach_2
spacy_doc_similarity: 0.9207733397821678
start word: love
Generated song:

---

love so bye be the power than that i
do
i m young time beyond that a rose of of a me and in left midnight i saw the secret then darlin wa been onc apart in me to die so honey outsid but now roba when with that s strang
it is go the one and bethlehem
left and use south now at i bet
so grown caus you a snowman for too time
i re my shark what talk watch the head down into least but you wa
feel my foolish game no
time way nothin me me &