

# A Hybrid Convolutional Variational Autoencoder for Text Generation

Stanislau Semeniuta<sup>1</sup> Aliaksei Severyn<sup>2</sup> Erhardt Barth<sup>1</sup>

<sup>1</sup>Universität zu Lübeck, Institut für Neuro- und Bioinformatik

{stas,barth}@inb.uni-luebeck.de

<sup>2</sup>Google Research Europe

severyn@google.com

## Abstract

In this supplemental material we include more random samples from our hybrid VAE model and LSTM VAE (Bowman et al. 2016). We also perform linear operations in the latent space to demonstrate they result in smooth and syntactically correct transitions between generated texts.

## 1 Random Samples

Table 1 contains random samples generated by our hybrid model with LSTM decoder while Table 2 contains samples from LSTM VAE. As already demonstrated by our experiments in Section 4.3, for LSTM VAE model it is much harder to find solutions with KL terms significantly different from zero, which results in redundant and uninteresting samples generated by the model. We have experimented with larger dropout rates but found that this did not lead to better samples. In contrast, samples from our model have much more variation both in the length and the content.

## 2 Linear operations in the latent space

Bowman et al. (2016) have shown that LSTM-based VAE for text produces latent representations such that linear operations on latent vectors result in meaningful transformations of generated texts. In Table 3 we present interpolation examples produced by our hybrid model. Note gradual changes in length of generated tweets, consistent usage of topics along trajectories and generally sensible structure.

@userid you're welcome hope you had a good day  
 @userid you deserve it!!!  
 Good night twitter fam  
 I love this place to be on @userid what a good morning #happybirthday #happy url  
 @userid love you too @userid  
 My sister is the best thing to do with me  
 @userid I LOVE YOU TOO  
 Please look @userid been.  
 @userid you're welcome i love you so much &lt;3 &lt;3 &lt;3  
 @userid lol sorry for the show I am so excited for tomorrow what a good day to see it with you all to see you x  
 Please let me know what to do  
 @userid @userid @userid well done I want to see you again so we can find a show tomorrow #happybirthday  
 @userid no problem ... I will be fine thank you for the follow  
 @userid Hi ! Can you rt this tweet please ? this is very important to me I love you :3 photo by @userid 2  
 Now that is my birthday and the weekend is over!!  
 If you want the song that you can't wait  
 @userid hey could you please vote for my band Sait Believe to open for I am giant ? url  
 @userid I am so thank you for the shout out there! Happy to help out with your tweet  
 @userid they said my fave would notice me this month, will you? xx i love you xx400  
 @userid @userid hope the second season  
 @userid Hello How are you doing?  
 And I wanna be the same town  
 @userid I know haha xx  
 @userid aww thanks so much for the follow! have a great day! #CornettoWelcomesTaylorToManila  
 @userid ... I love you so much I love you so much &lt;3 &lt;3  
 Well I don't have to wait till the 19th url  
 Goodnight friends  
 @userid for that person and they are all good thank you for the shoutout #SelenaForMMVA  
 @userid Hello mate! We're glad you like it  
 " @Sarah\_Bear: Why not? #SelenaForMMVA  
 When i see the start to the fault in our  
 #tbt to the first 10 mins of the day I have to wait till 10  
 Looking forward for @userid at #TFIOS tonight with the graduation tomorrow! #GoodMorning #StarCrossed  
 @userid Hi can. I love you so much &lt;3  
 @userid I will be on FB and we can try it  
 @userid hey cam, i love you so much, follow me please, make me happy cam #FollowMeCam #FollowMeCam #FollowMeCam 1  
 I'm gonna miss my best friends #happy #instafood #love url  
 Don't forget to do more than a month... url  
 @userid like that... I have a lot of time to take a look #startup #followmecam x  
 @userid you should get that that would be a great place

Table 1: Random samples from ou hybrid model trained with  $\alpha = 0.2$ .

@userid @userid @userid @userid @userid @userid @userid @userid @userid ...  
 @userid thank you  
 I want to see you so much please follow me #FollowMeCam @userid x1  
 Lood morning @userid url  
 @userid @userid @userid @userid @userid @userid @userid @userid @userid ...  
 I want to see you so much please pick me @userid PLEASE #KedsRedTour ...  
 I love the best to me the best on the world to me  
 @userid @userid @userid @userid @userid @userid @userid @userid @userid ...  
 I want to see you to me that the world to me  
 @userid @userid @userid @userid @userid @userid @userid @userid @userid ...  
 @userid @userid @userid @userid @userid @userid @userid @userid @userid ...  
 @userid thank you xx  
 I love you so much @userid @userid xxx  
 I want to see you so much @userid @userid @userid @userid @userid @userid @userid @userid x15  
 @userid @userid @userid @userid @userid @userid @userid @userid @userid ...  
 I want to see you so much @userid I love you so much x #FollowMeCam ...

Table 2: Random samples from the LSTM VAE model with  $p = 0.5$ . We have truncated samples that repeat the same hashtag or "@userid" sequence.

**@userid I do that too. I have to wait a lot of people too**  
@userid I do not know about it and then I can find a contest  
@userid I am so excited for this summer I hope you are well  
@userid i don't know what to do in the morning i love you so much for the shoutout  
@userid i don't know what to do if you don't mind follow me i love you so much xx  
@userid it would be awesome to hear it's a great place to see you around the weekends  
**@userid it would be awesome to hear I'm so excited for the summer I'm going to see them**

---

**Just been to my best friend and it was a great time in the world and I have to wait till the weekend**  
Just been to my best friend and it was a great time with the story of the day #happy #goodnight  
Just been to my best friend and it was a great time with the stream #happy #summer #sunshine  
So the first of my students are all going to the start to the start of the day #happy #goodnight  
So the fault in our stars is the best day of the week and it's all good  
@userid LOL I'm just going to see you and the students to the start  
**@userid LOL I'm just going to see you at the end of the day hahaha**

---

**@userid @userid I will have to wait till I'm off to school tomorrow i hope you get a good day xx**  
@userid @userid I will have to wait till I'm done with you and the world is amazing how are you?  
@userid @userid I will have to see it tomorrow for the first time with you and the best for you  
@userid So sad I have to go back to the pool but it's a beautiful day for the weekend  
@userid I am so excited for you to come to the pool and I will see it tomorrow  
There's a few more weeks of summer and the world will be @userid  
**Make it a good day today #summer #selfie #girls #selfie @userid**

---

**@userid I am so sorry to hear that**  
@userid I am so sorry  
@userid I was a good day  
@userid I want to see it  
@userid aw thank you  
@userid my pleasure  
**@userid my pleasure**

Table 3: Linear interpolations between two randomly selected points in the latent space generated by our hybrid model. Sentences representing begin and end points are bolded.