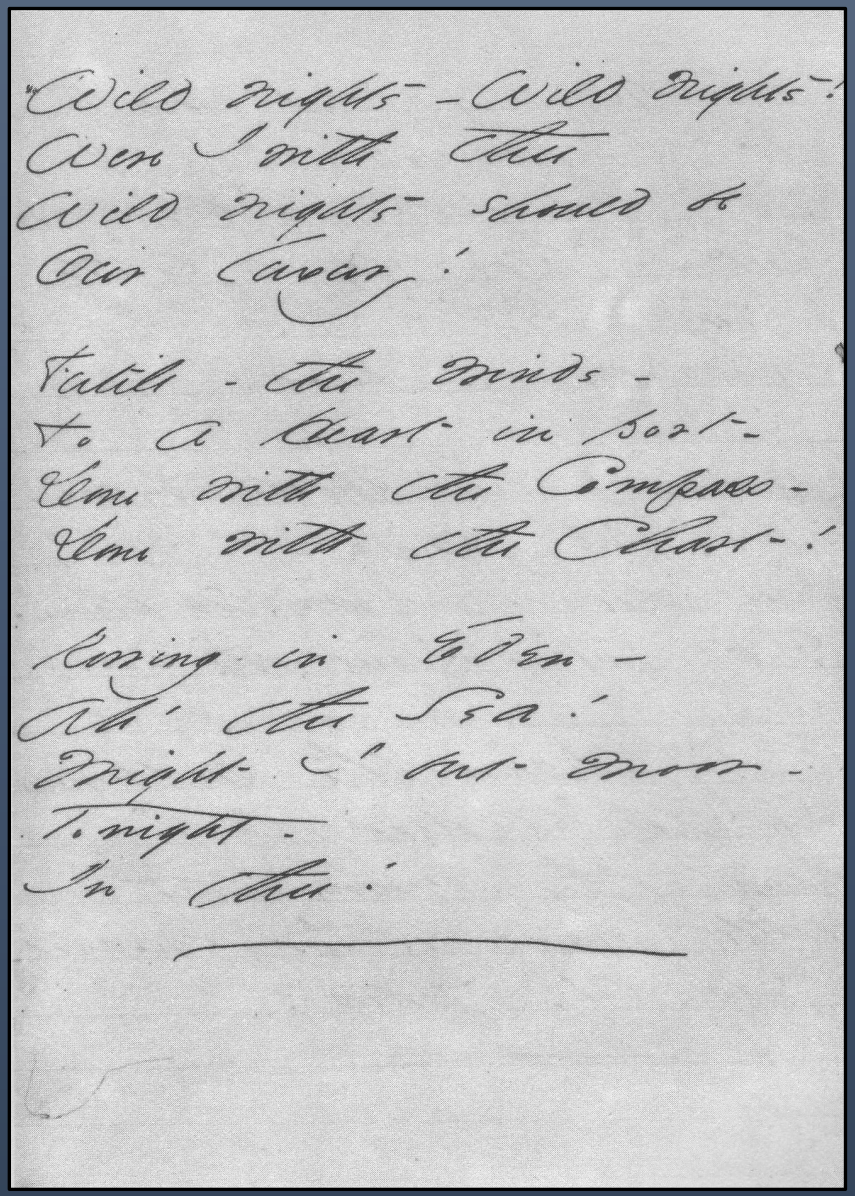
Automated Poetry Generation

Ryan Moreno

Research Proposal
November 5, 2019

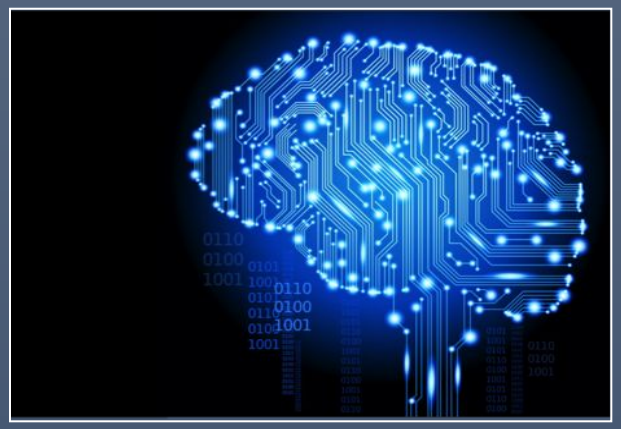


USC Viterbi
School of Engineering

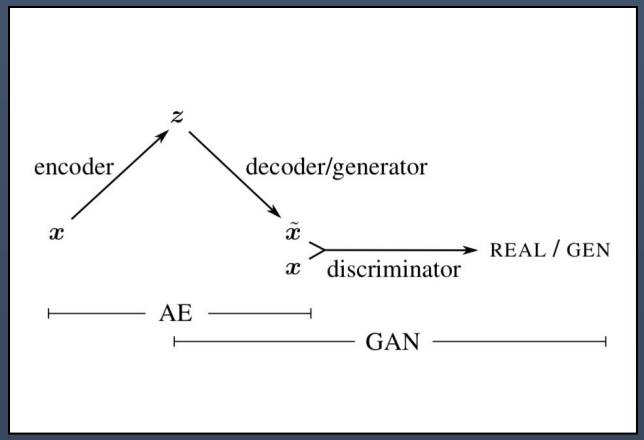
This talk presents past research on poetry generation and lays out future steps

(1)	The	**cur**few	**tolls** the	**knell** of	**par**ting	**day**
(2)	The	**day**	**tolls** the	**cur**few of	**par**ting	**knell**
(3)	The	**cur**few	**tolls** the	**knell**		
(4)	There	**once** was a	**man** from Bra-	**zil**		
(5)	A	**me**tre	**pat**tern	**holds** a	**bunch** of	**beats**

Poetry generation techniques

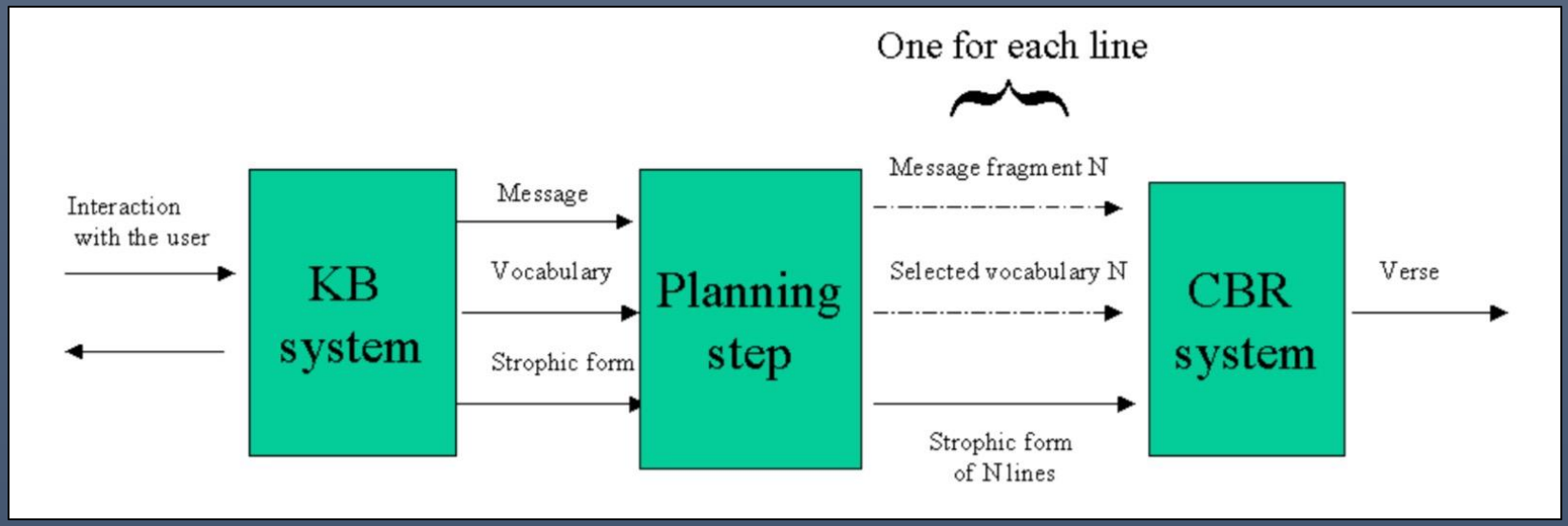


Deep learning techniques



Project proposal

Rule-based approaches to poetry generation fall short: ASPERA



Sabed que en mi perfecta edad y armado
con mis ojos abiertos me he rendido
al niño que sabéis ciego y desnudo.

Ladrará la verdad el viento airado
en tal corazón por una planta dulce
al arbusto que volais mudo o helado.

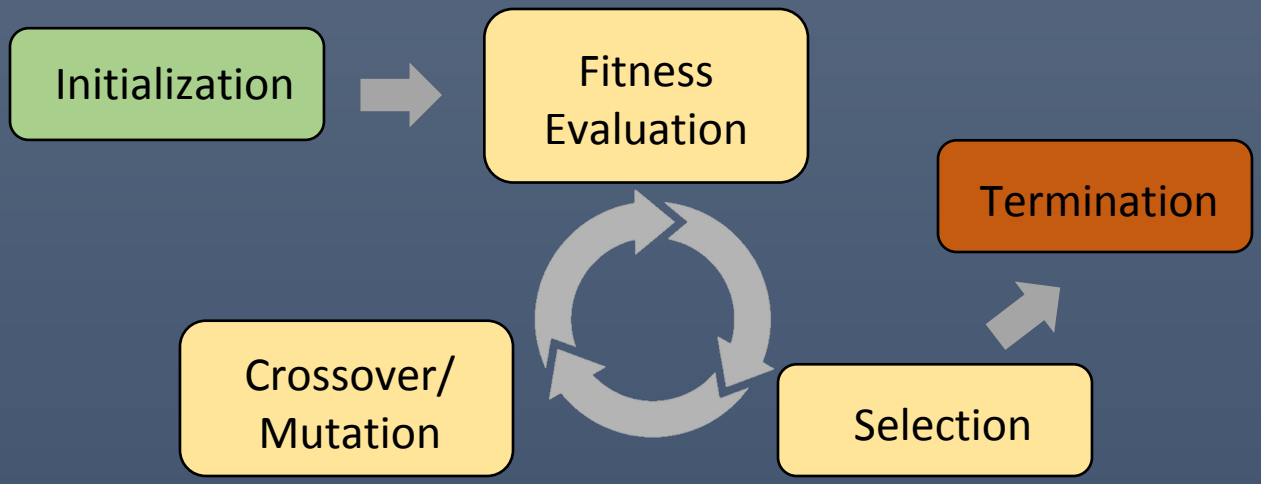
The angry wind will bark the truth
in such a heart for a sweet plant
to the bush that you are silent or frozen.

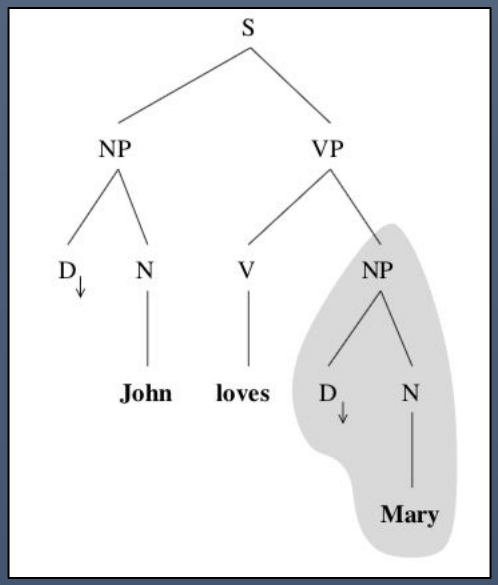
Rule-based approaches to poetry generation fall short: Racter

A crow is a bird, an eagle is a bird, a dove is a bird.
They all fly in the night and in the day. They fly when
the sky is red and when the heaven is blue. They fly through
the atmosphere. We cannot fly. We are not like a crow or
an eagle or a dove. We are not birds. But we can dream about
them. You can.

The Policeman's Beard is Half Constructed

Evolutionary approaches to poetry generation fall short: McGonagall



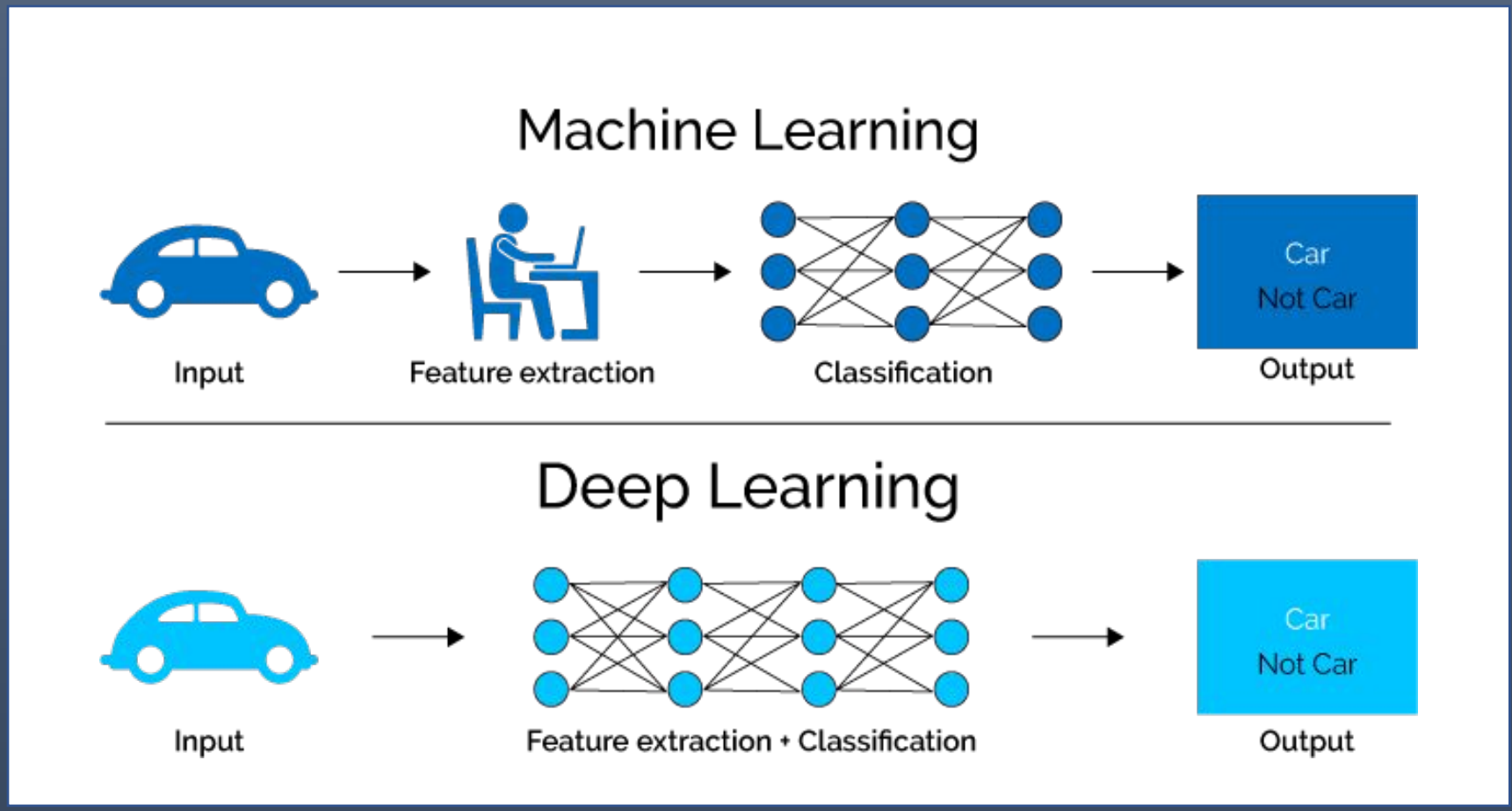


The African lion, he dwells in the waste,
he has a big head and a very small waist;
but his shoulders are stark, and his jaws they are grim,
and a good little child will not play with him.

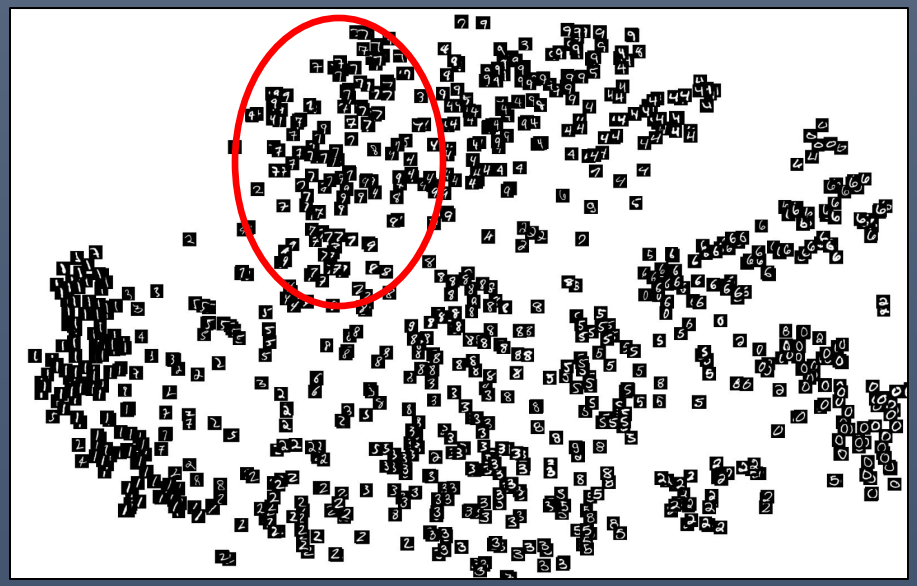
haiku form

In a waste, a lion,
who has a very small waist,
dwells in a big head.

Deep learning is effective because it learns abstract concepts



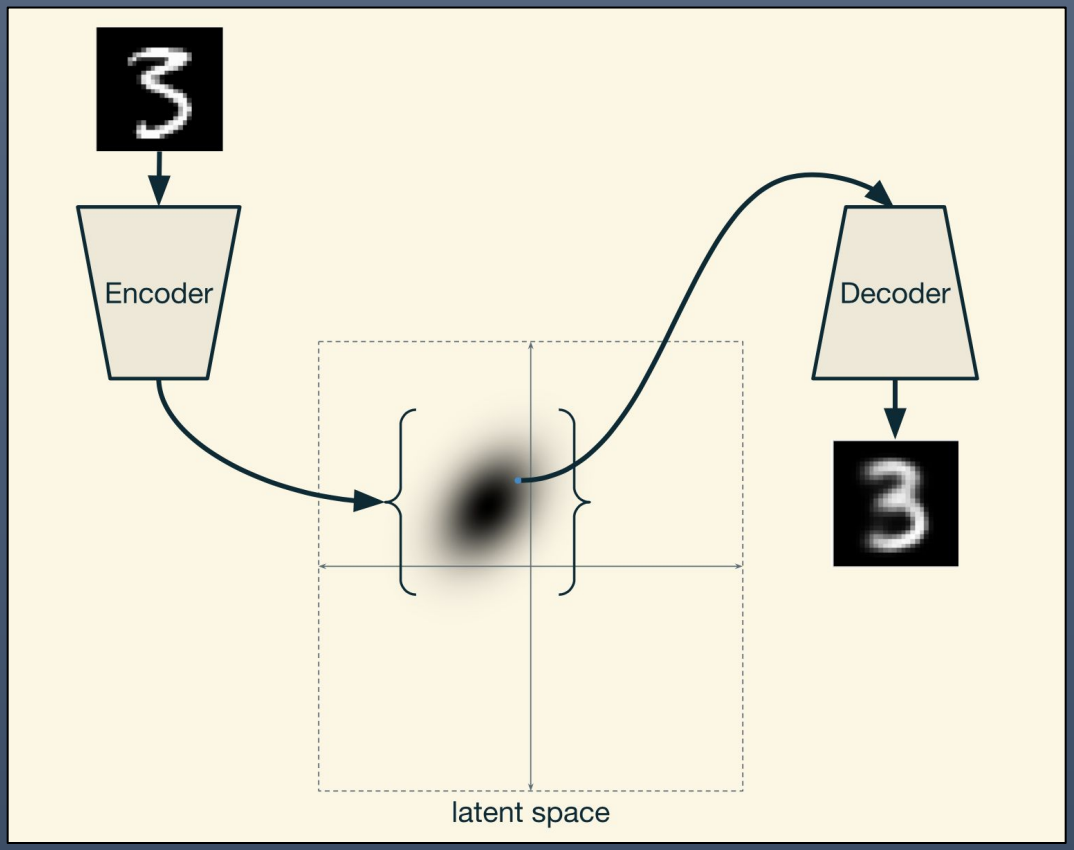
Latent space holds abstract representations of objects



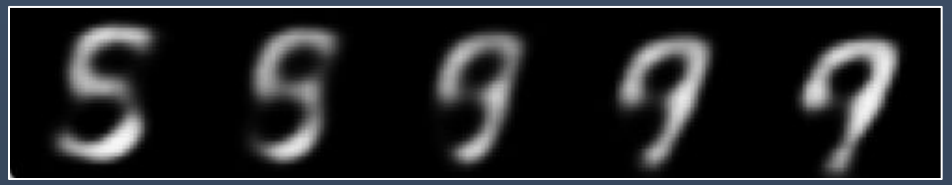
Pixel Space

Latent Space

Variational autoencoders learn to encode and decode objects to and from latent space

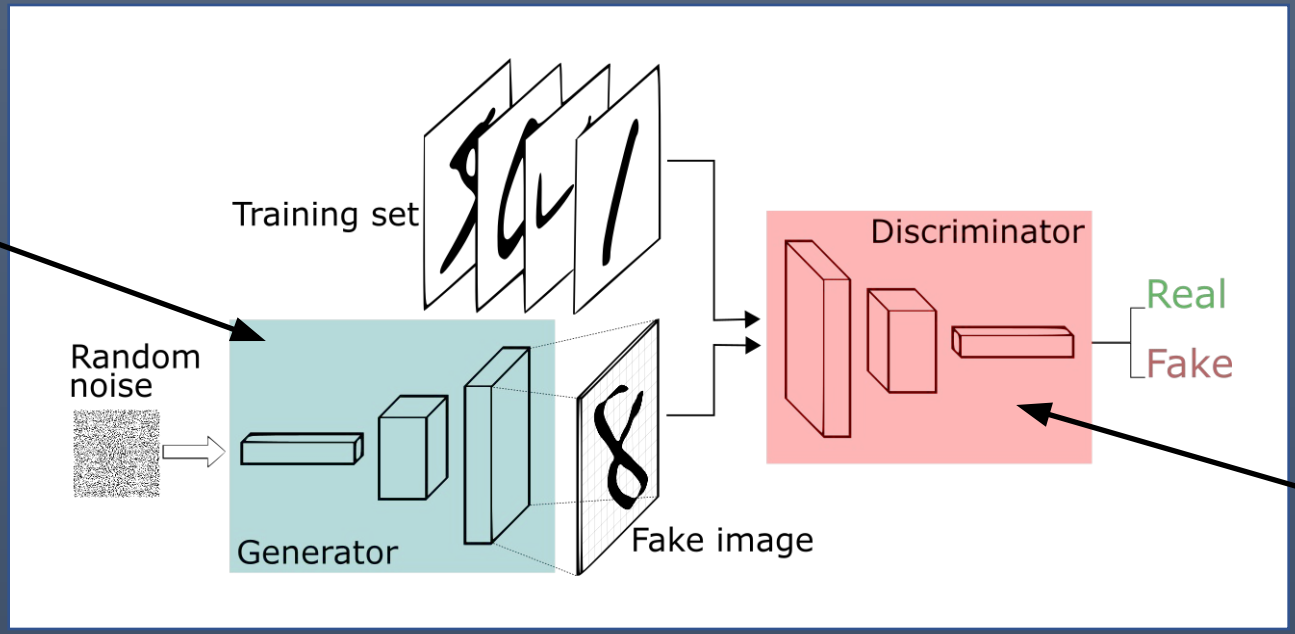


Walking through pixel space

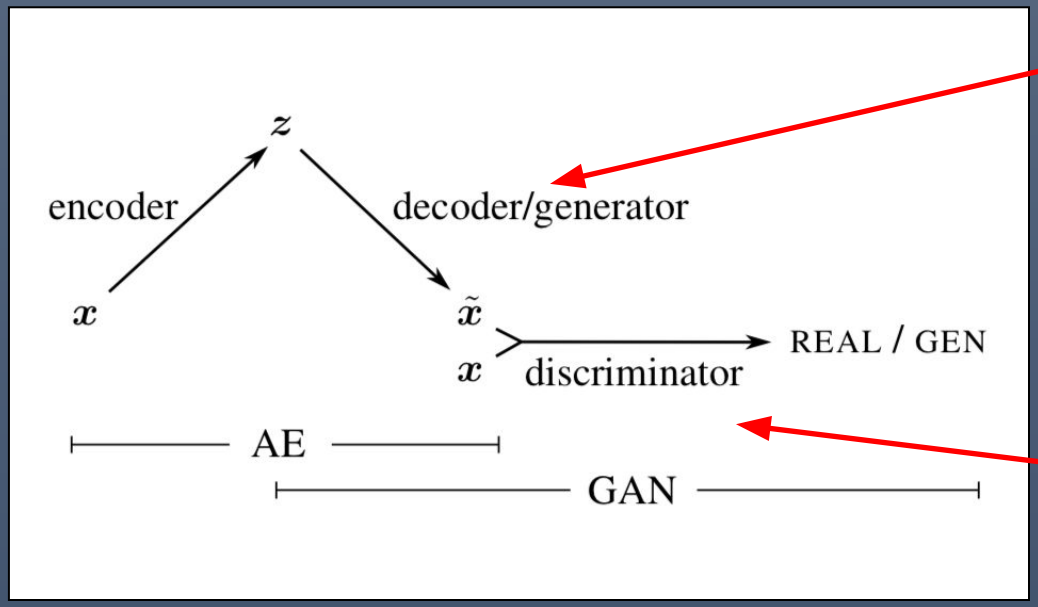


Walking through latent space

Generative adversarial networks train two neural networks against each other to improve both

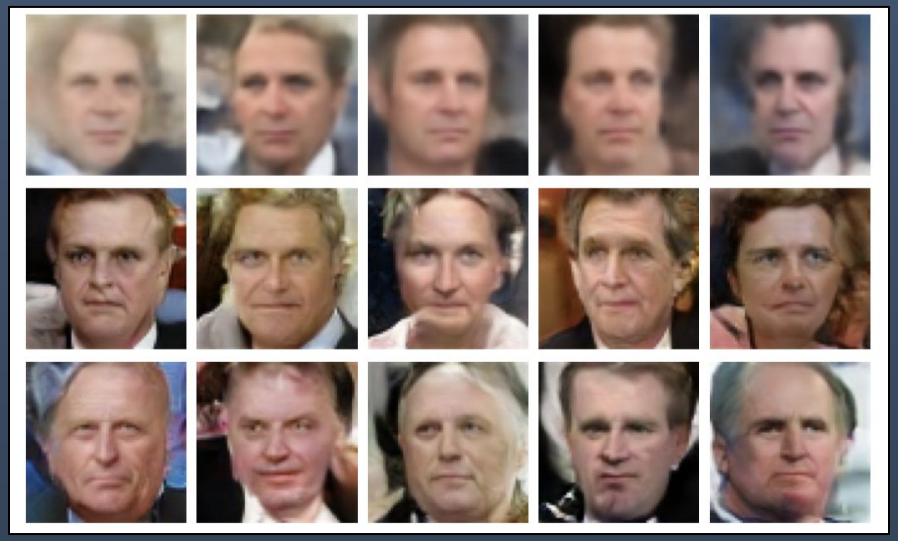


Variational autoencoders and generational adversarial networks can be combined



VAE's decoder provides GAN with a generator

GAN's discriminator provides VAE with a similarity metric

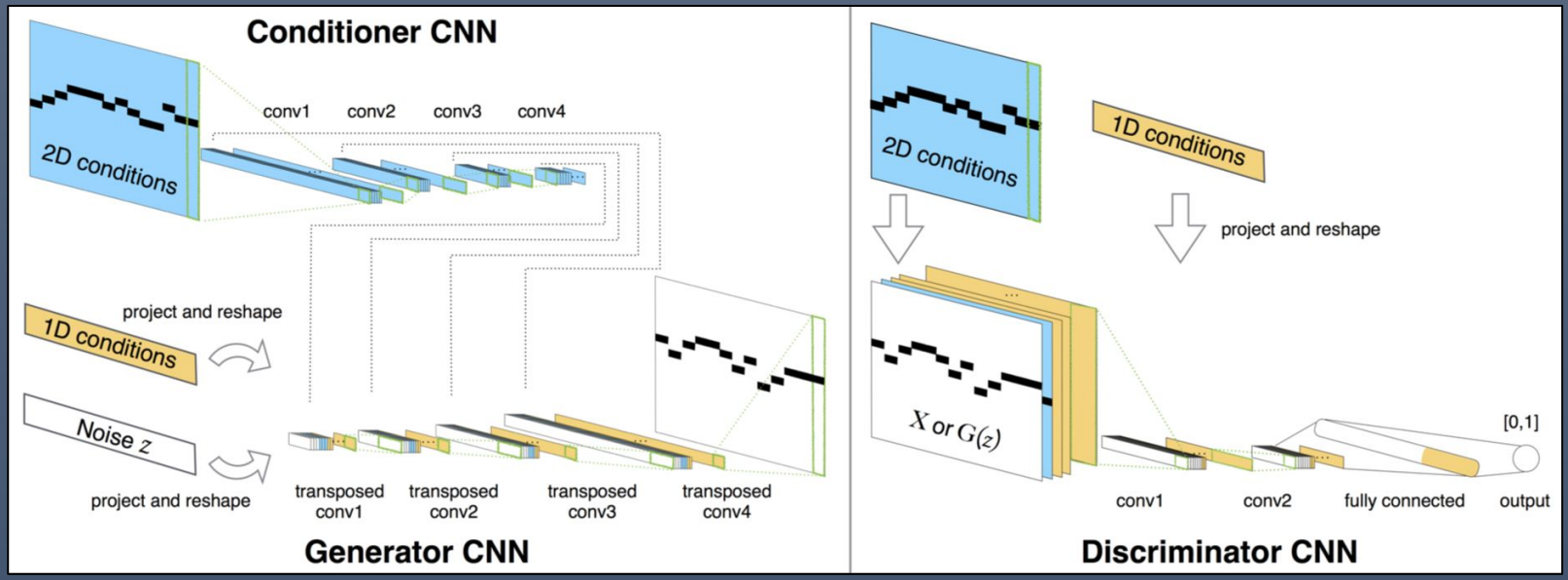


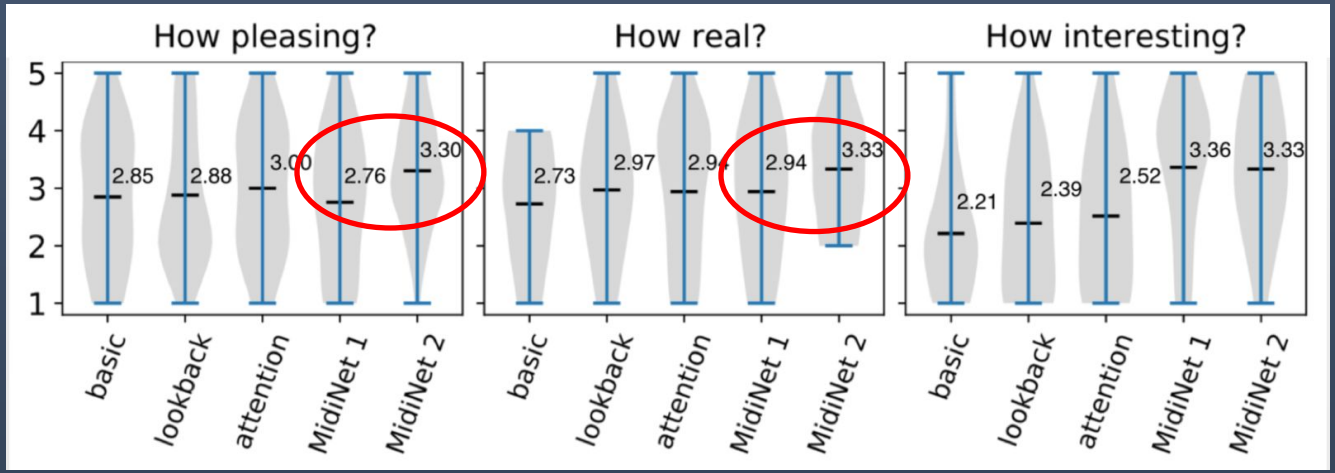
VAE

GAN

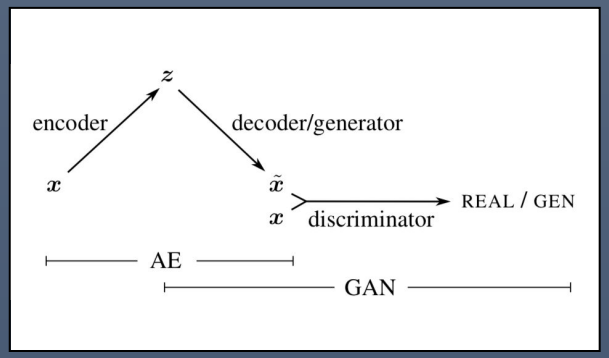
VAE/GAN

A conditioner can influence the outputs of a generative network

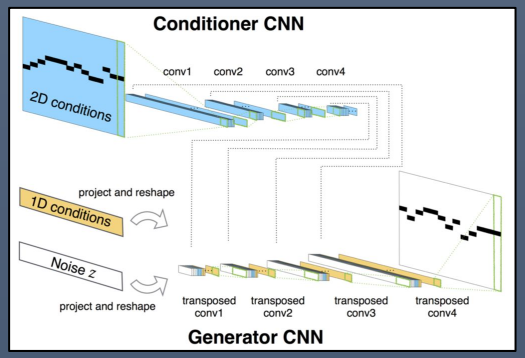




My project proposal incorporates the best of these poetry generation and deep learning techniques



VAE/GAN framework



Condition stanzas with previous stanzas

Hardcode grammar in generator

- Deep learning handles abstract ideas
- Grammar is rule-based

Questions?

USC Viterbi School of Engineering

References

[1] J. Ledbetter, "RACTER, the poetic computer." *The New Republic*, vol. 195, no. 6, Aug 1986.

[2] W. Chamberlain and J. Hall, *The Policeman's Beard is Half Constructed*, New York City, Country: Warner Books, Inc., 1984.

[3] P. Gervas. "An Expert System for the Composition of Formal Spanish Poetry." *Knowledge Based Systems*, vol. 14, no. 3, pp. 181-188, 2001.

[4] H. Manurung, "An evolutionary algorithm approach to poetry generation." *University of Edinburgh, College of Science and Engineering, School of Informatics,* Jul, 2007.

[5] A. Nguyen et al, "Innovation Engines: Automated Creativity and Improved Stochastic Optimization via Deep Learning" in *Proceedings of the Genetic and Evolutionary Computation Conference*, 2015.

[6] J. Despois, *Latent space visualization - deep learning bits #2*, Feb, 2017.

[7] J. Wu et al, "Learning a probabilistic latent space of object shapes via 3D generative- adversarial modeling." Oct 2016.

[8] C. Doersch, "Tutorial on Variational Autoencoders." *Carnegie Mellon/UC Berkeley*, Aug 2016.

[9] C. Nash and C. K. I. Williams, "The shape variational autoencoder: A deep generative model of part-segmented 3D objects," in *Eurographics Symposium on Geometry Processing*, vol. 36, no. 5, 2017.

[10] I. J. Goodfellow et al, "Generative Adversarial Nets." *Department d'informatique et de recherche operationnelle*, Montreal, Canada, Jun 2014.

[11] L. Yang et al, "MidiNet: A Convolutional Generative Adversarial Network for Symbolic domain Music Generation." *Research Center for IT innovation,* Taipei, Taiwan, July 2017.

[12] J. Gauthier, "Conditional generative adversarial nets for convolutional face generation." *Symbolic Systems Program, Natural Language Processing Group*, Stanford University, 2015.

[13] A. Larsen et al. "Autoencoding beyond pixels using a learned similarity metric." Feb 2016.

[14] A. Nguyen, J. Yosinki, and J. Clune, "Multifaceted Feature Visualization: Uncovering the Different Types of Features Learned by Each Neuron in Deep Neural Networks." Feb 2016.