How image quality is improved progressively:

Further Improvements in StyleGAN:

1. **Style Mixing**
2. **Stochastic Variation**

This created amazing results where a single image is released from two types of latent codes w1 and w2 from z1 and z2.

Adding per pixel noise will help in better understanding of the minute textures in the images

Prevents the network to memorise the features that are correlated

https://youtu.be/kSLJriaOumA

Style Mixing:

Generator thinks of an image as a collection of "styles" where each style controls the effects at a particular scale :

- Coarse styles —› pose, hair, face shape

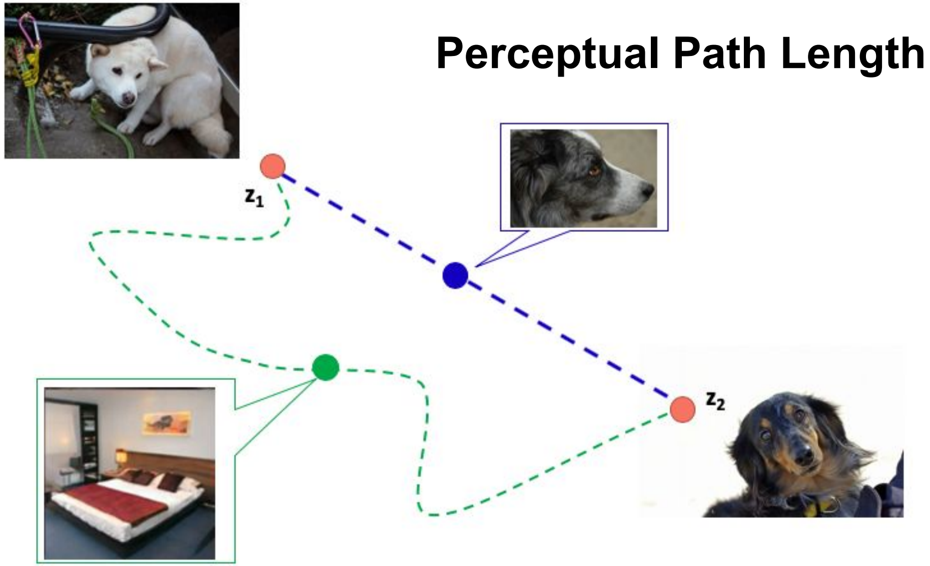
- Middle styles —› facial features, eyes

- Fine styles —› color scheme

Disentanglement Studies:

it is true that if we had latent codes of each of the face features we would be able to control the features in the image and come up with a completely different representation

1. **Perceptual Path Length**
2. **Linear Separability (Known already)**



This will find the distance between feature maps visually. If separating the images far off and we observe a drastic change, this means the feature maps are entangled. Suppose removing the hair feature removes ears also, then we need to take care of it as removing hair shall not remove ears.

Conclusion and Misc. Takeouts:

1. StyleGAN Allows a control over the features in the image.
2. Major changes from previous tools is AdaIN and Mapping Network.
3. Advantages over ProGAN : *Now you can easily manipulate entangled features. High quality and realistic images are generated.*
4. **Limitation**: Check for the blue line in the image. Smile is not changing wrt the Face Movement

Small Comparisons:

Conditional GAN (Exploiting the given labels and preserving class identities in early stages)	These GANs use extra label information and result in better quality images and are able to control how generated images will look. cGANs learn to produce better images by exploiting the information fed to the model.
Cycle GAN (For unpiared data)	CycleGAN is an extension to the GAN for image-to-image translation without paired image data. That means that examples of the target image are not required as is the case with conditional GANs. This we have briefly covered in class
PROGAN (Improving images progressively and increasing depth of GANS)	PROGan is a change to the architecture and training of GAN models that involves progressively increasing the model depth during the training process. *starting from a low resolution, we add new layers that model increasingly fine details as training progresses.*
StyleGAN	(Idea is to grab features from latent code and reducing the load on generator, which now focuses on constant latent code)

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