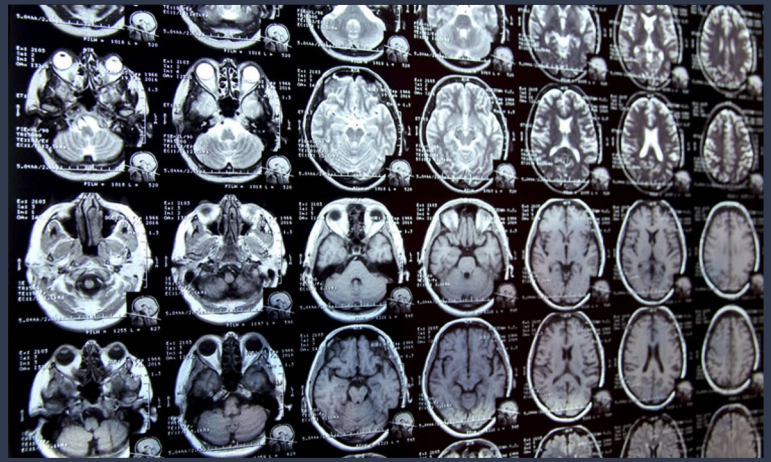
https://www.radnet.com/our-services/mri

Machine learning for MRI modality conversion

Names of participating students redacted for privacy

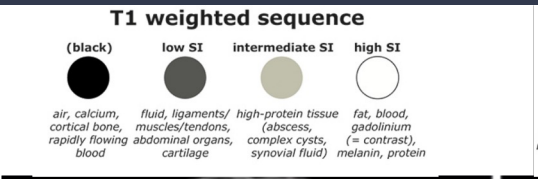
Contents

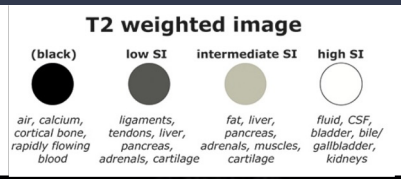


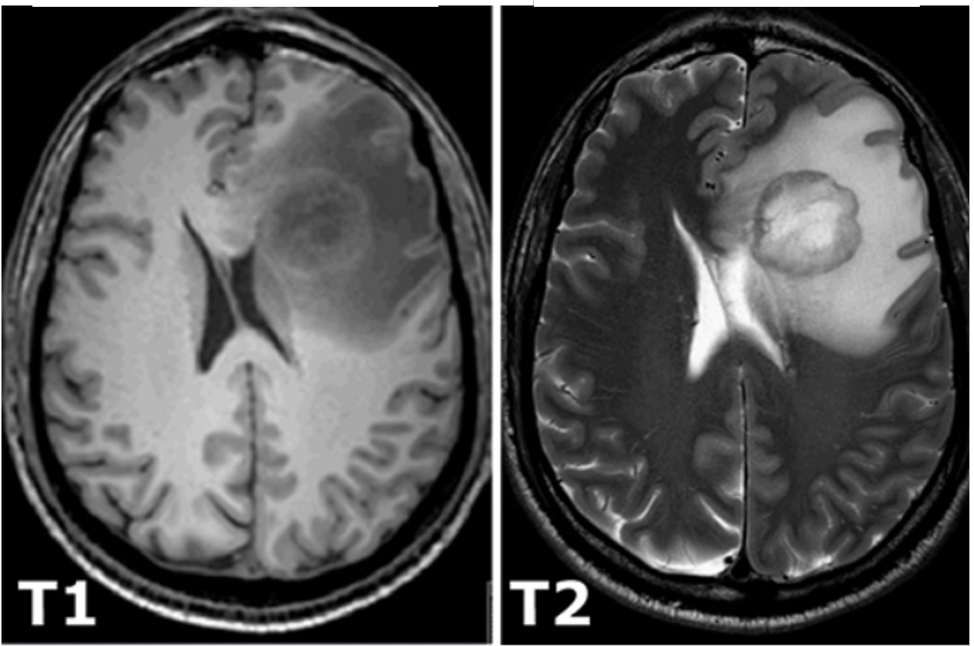
https://www.drugtargetreview.com/news/40651/mri-imaging/

- Introduction
- Image-to-Image translation
- Conditional Generative Adversarial Net (cGAN)
- Technical information
- Audience tests
- Results
- Conclusions

The project aims to develop and evaluate machine learning techniques for producing synthetic T2-weighted images from T1-weighted images, and vice versa







Paired MRI data improves automatic image segmentation and registration techniques

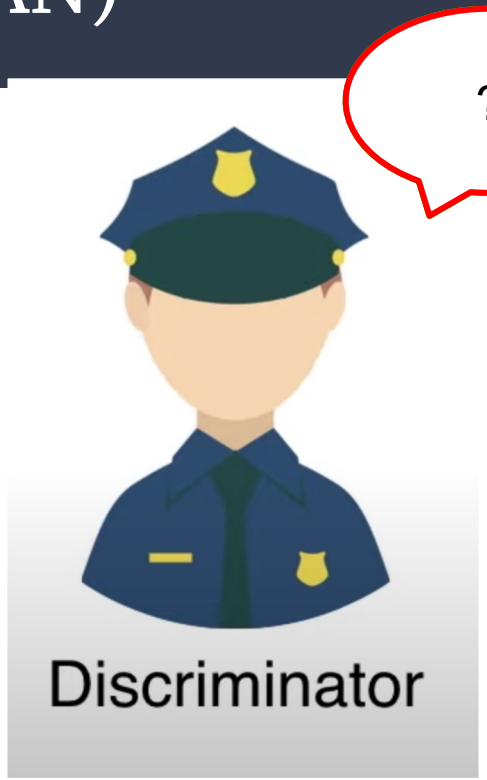
https://www.startradiology.com/the-basics/mri-technique/index.html

Image-to-image translation

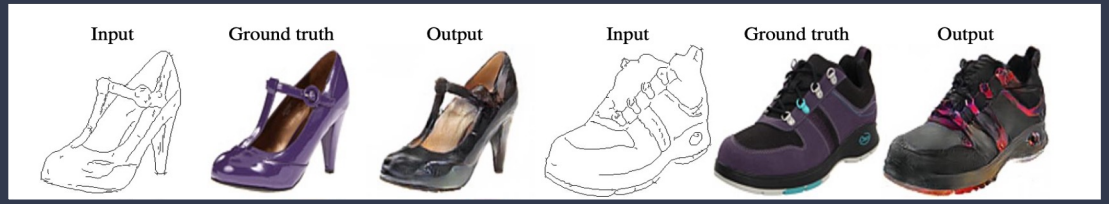
- Image-to-image translation: translating an input image into a corresponding output image.
- Mapping pixels to pixels.
- Conditional adversarial nets (cGAN) are generally used to solve image-to-image translation problems.

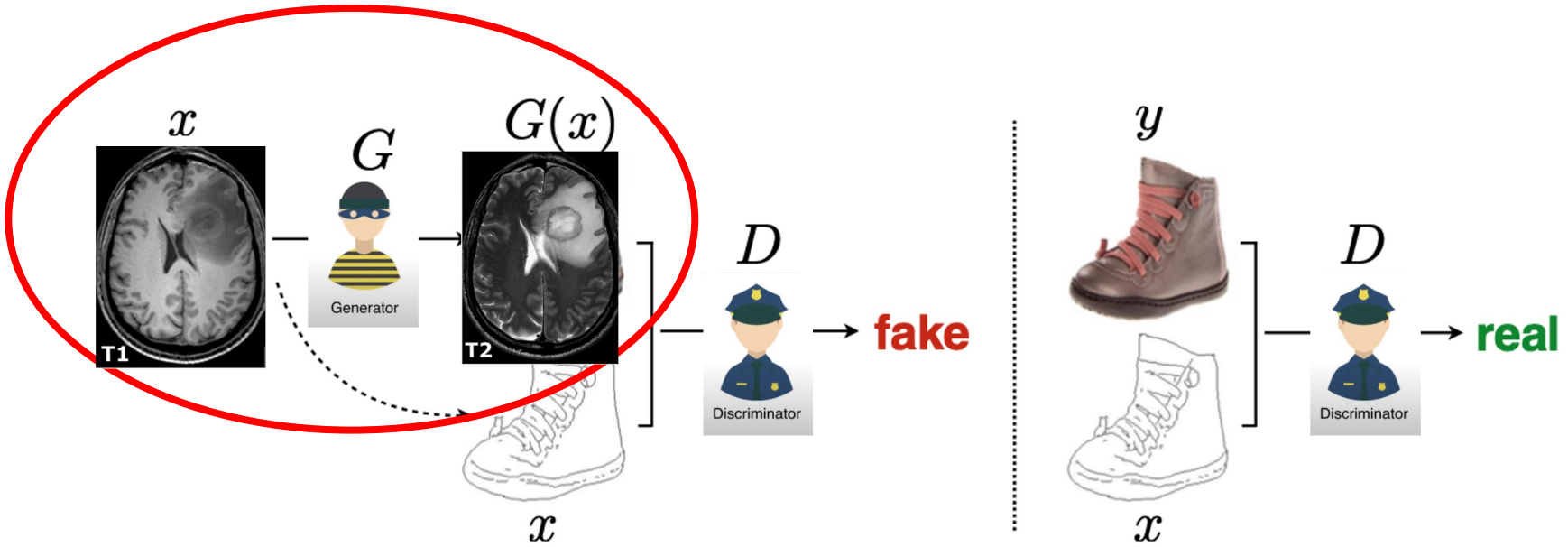
Isola, P., Zhu, J. Y., Zhou, T., & Efros, A. A. (2017). Image-to-image translation with conditional adversarial networks. In Proceedings of the IEEE conference on computer vision and pattern recognition (pp. 1125-1134).

Generative Adversarial Net (GAN)



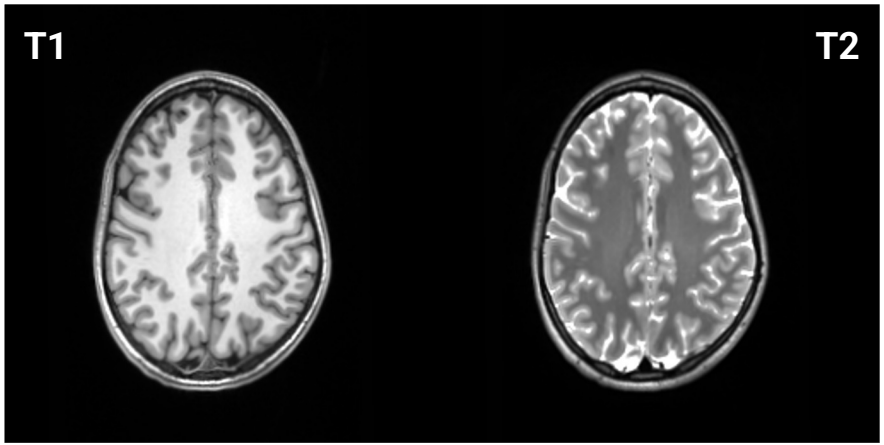
Pix2Pix cGAN





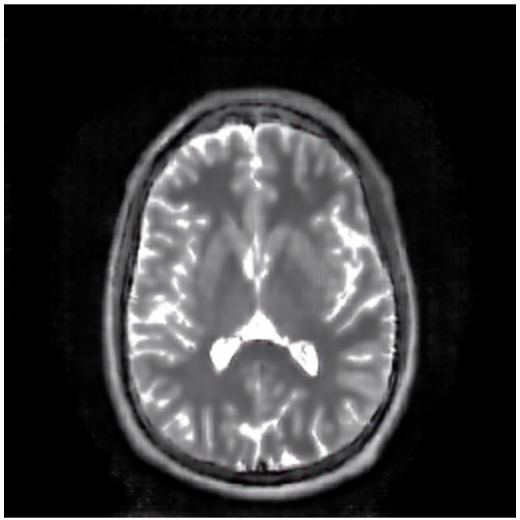
Technical information

- Python 3.8
- Tensorflow 2.4.1
- Modified version of Pix2Pix architecture
- 60 epochs
- Training set: 8160 combined images of T1 and T2



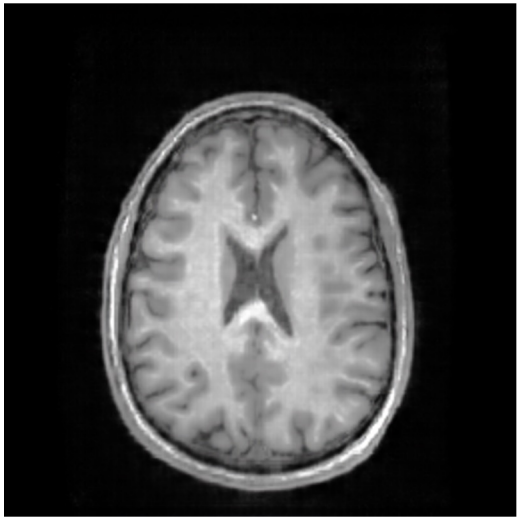
Is the image generated by our model?

Image #1



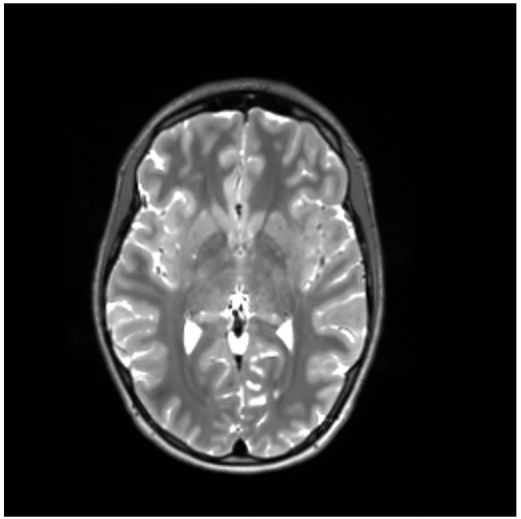
Answer

Image # 2



Answer

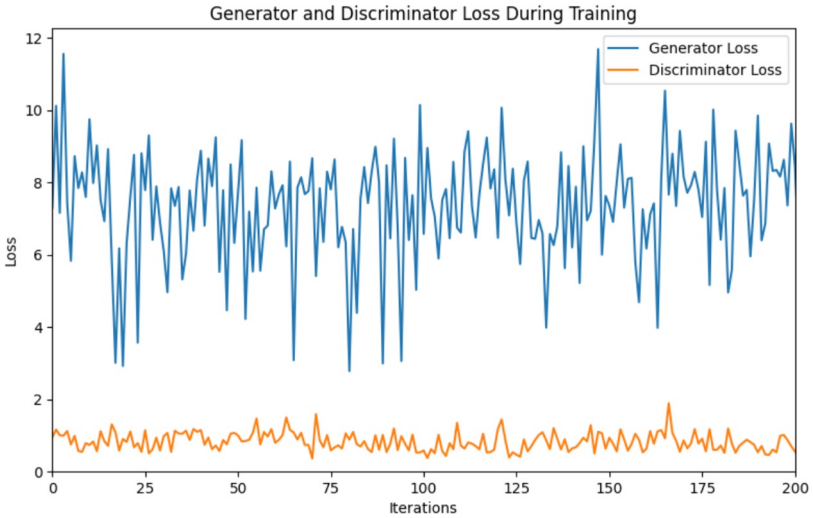
Image # 3



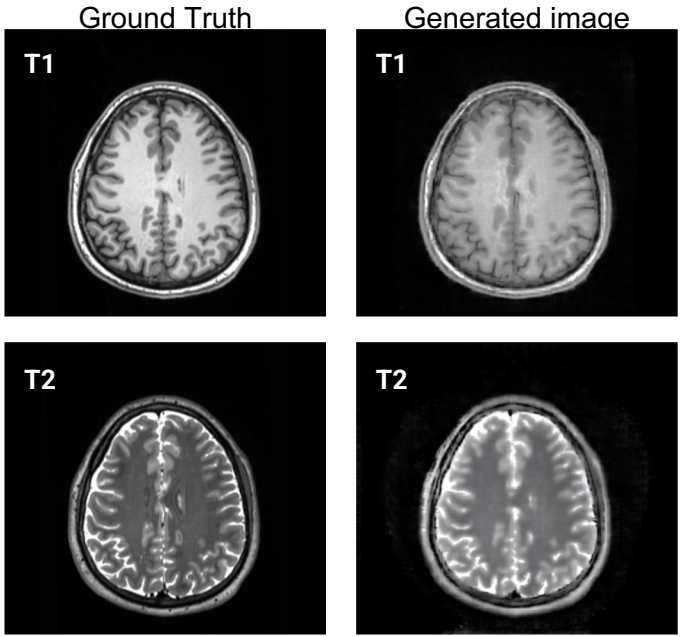
Answer

Results

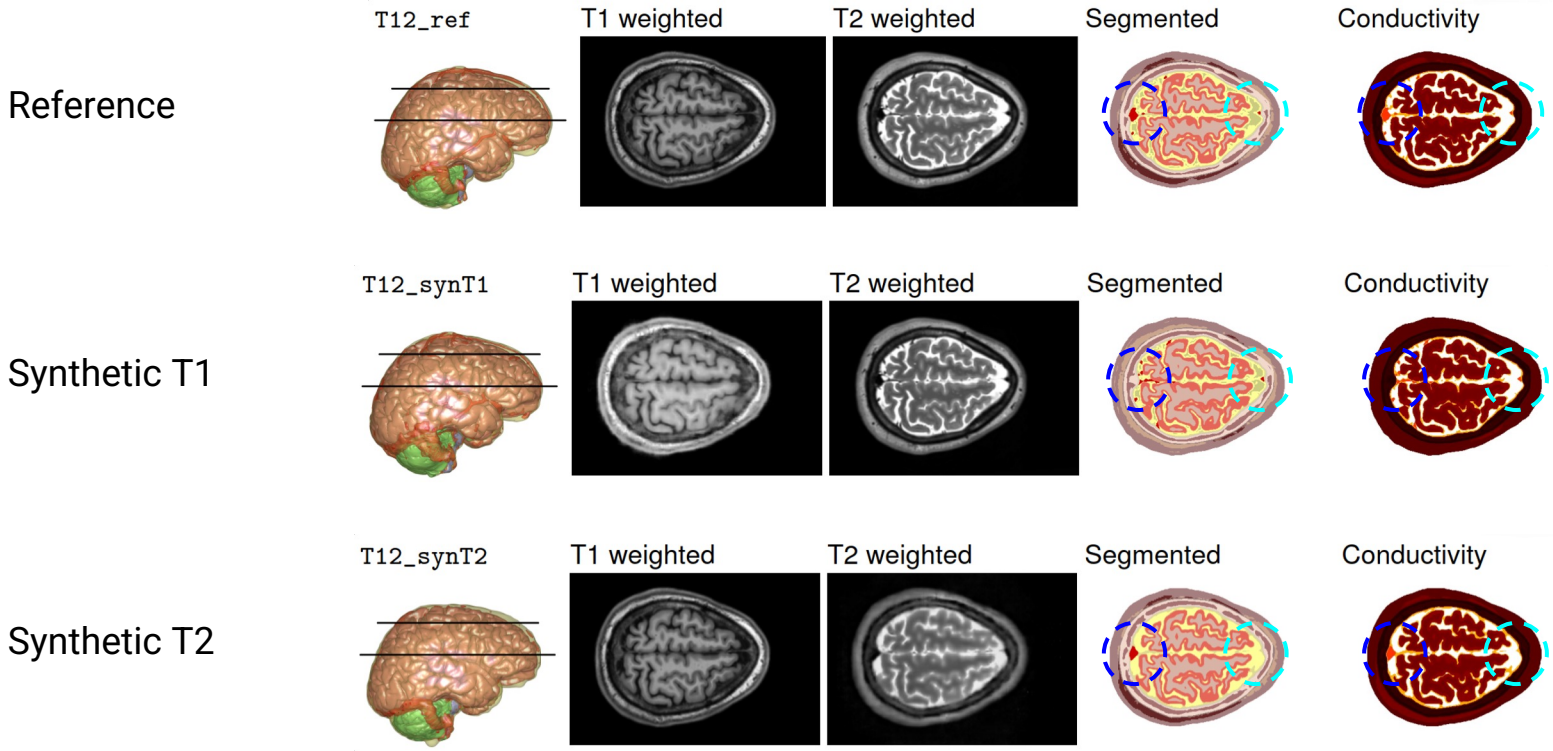
Model validation with 200 epochs and 300 images as training data.



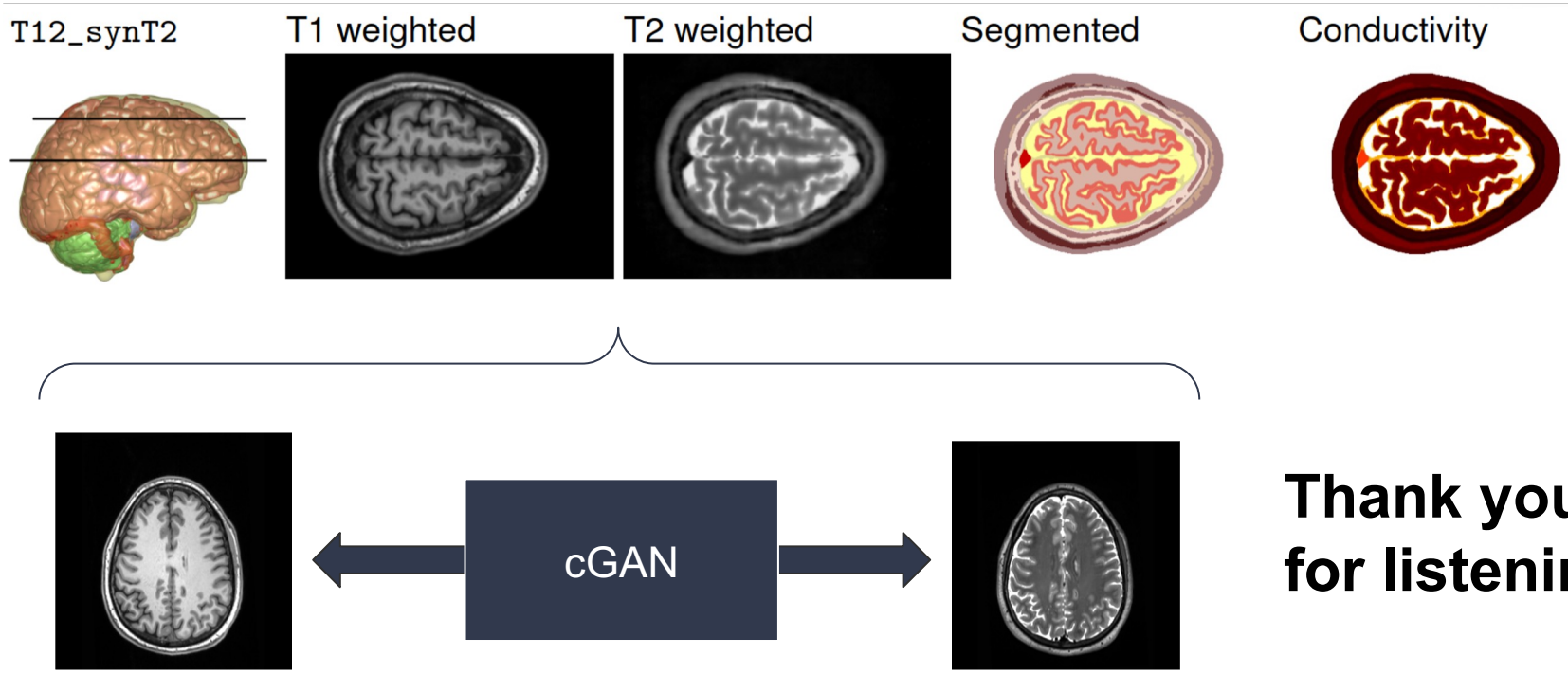
Results from trained model with 60 epochs and 8160 images as training data.



Segmentation results



Conclusion



Thank you for listening!