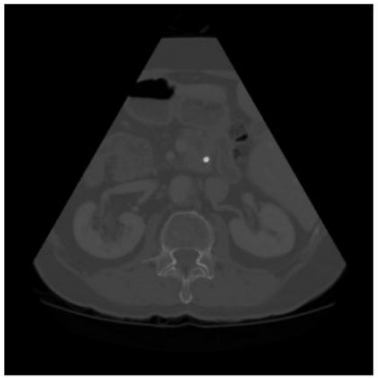
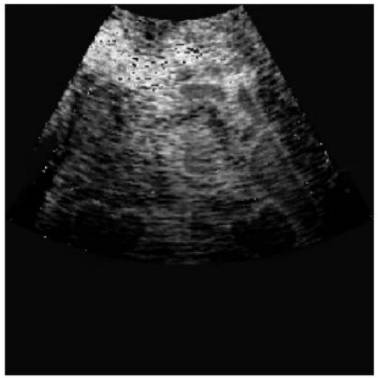
S-CycleGAN: Semantic Segmentation Enhanced CT-Ultrasound Image-to-Image Translation for Robotic Ultrasonography

Problematica

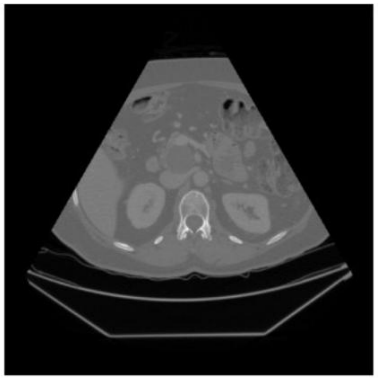
Limitada disponibilidad de datos de calidad para el entrenamiento de modelos de deep learning en imágenes de ultrasonido.



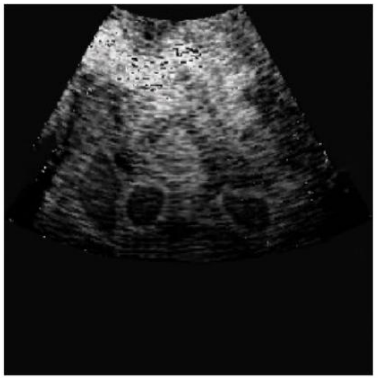
(a) Real CT



(b) Fake US



(a) Real CT



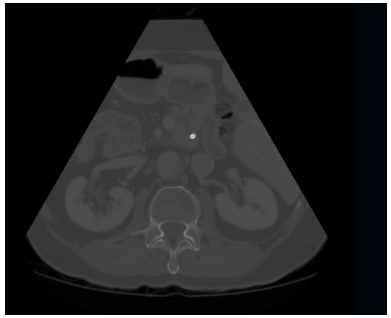
(b) Fake US

Y. Song and N. Y. Chong, "S-CycleGAN: Semantic Segmentation Enhanced CT-Ultrasound Image-to-Image Translation for Robotic Ultrasonography," in *Journal of Medical Imaging and Health Informatics*, vol. 4, no. 3, pp. 123-134, Aug. 2024. Available: https://github.com/yhsong98/ct-us-i2i-translation

Tomografía computarizada

Selección de data

AbdomenCT-1K dataset



1000 escaneos CT

200 escaneos CT

10 cortes transversales

Imágenes de Ultrasonido

El dataset muestra imágenes simuladas y reales

US real

US Simulada

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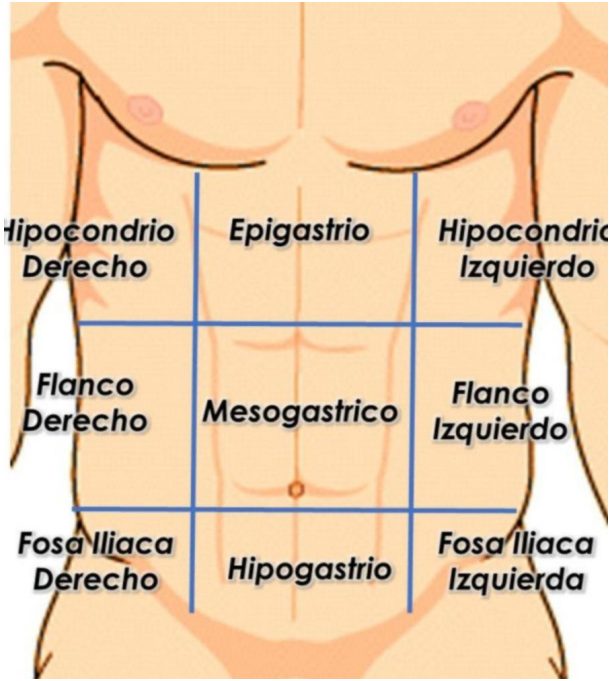
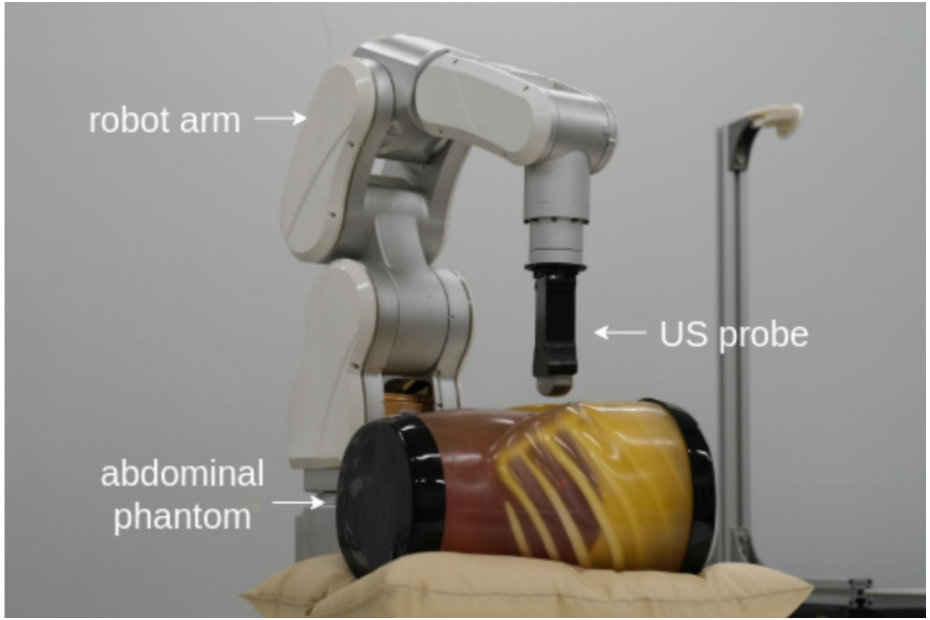
Zona de trabajo



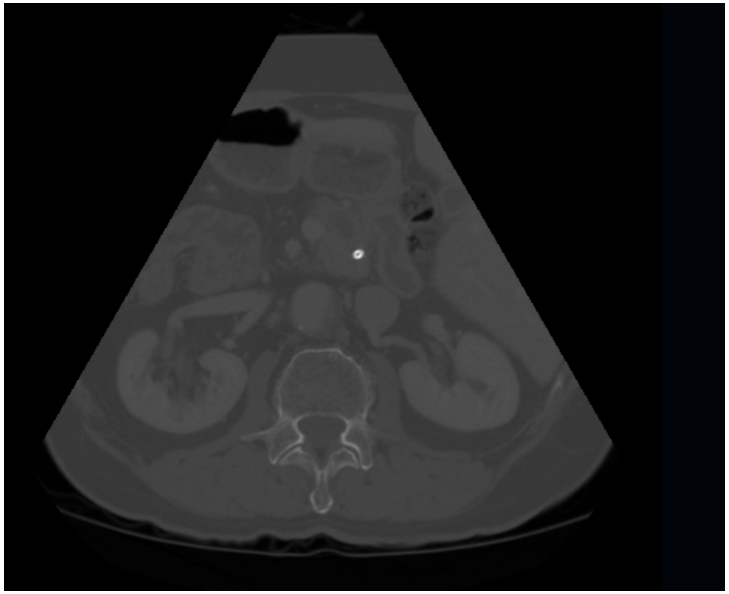


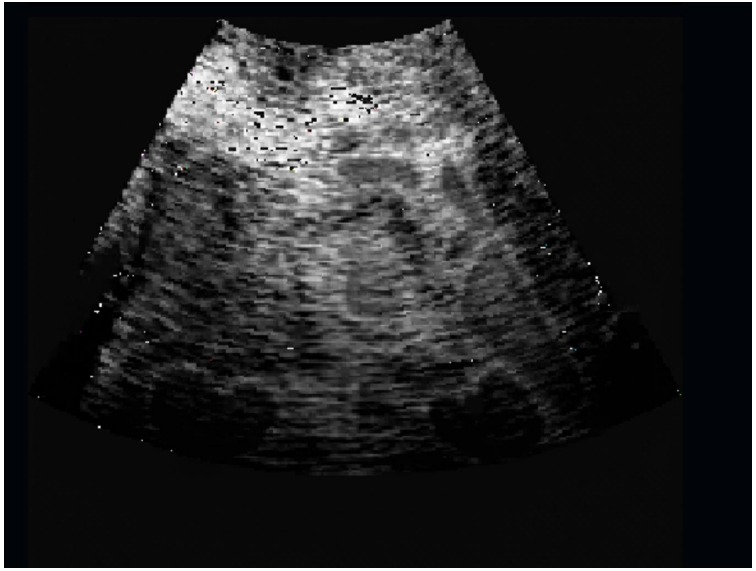
Y. Song and N. Y. Chong, "S-CycleGAN: Semantic Segmentation Enhanced CT-Ultrasound Image-to-Image Translation for Robotic Ultrasonography," in *Journal of Medical Imaging and Health Informatics*, vol. 4, no. 3, pp. 123-134, Aug. 2024. Available: https://github.com/yhsong98/ct-us-i2i-translation

CycleGAN

Jun-Yan Zhu*, Taesung Park*, Phillip Isola, and Alexei A. Efros. "Unpaired Image-to-Image Translation using Cycle-Consistent Adversarial Networks

CT a US



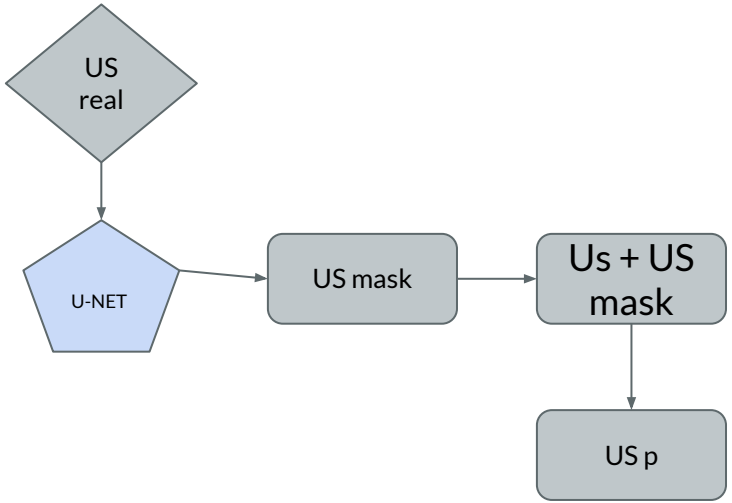


Y. Song and N. Y. Chong, "S-CycleGAN: Semantic Segmentation Enhanced CT-Ultrasound Image-to-Image Translation for Robotic Ultrasonography," in *Journal of Medical Imaging and Health Informatics*, vol. 4, no. 3, pp. 123-134, Aug. 2024. Available: https://github.com/yhsong98/ct-us-i2i-translation

Imágenes de Ultrasonido

El flujo de preprocesamiento de las imágenes reales es:

US real



MÉTRICAS DE EVALUACIÓN

Adversarial Loss

- **Generador (G):** Mide la habilidad para engañar al discriminador.
- **Discriminador (D):** Evalúa la capacidad para diferenciar

Cycle Consistency Loss

- G:X→Y
- F:Y→X
- Evalúa la pérdida al transformar una imagen y viceversa

Segmentation Loss

- Entropía cruzada
- Pérdida de Dice

Goodfellow, I., Pouget-Abadie, J., Mirza, M., Xu, B., Warde-Farley, D., Ozair, S., Courville, A., & Bengio, Y. (2014). Generative adversarial net
In *Advances in neural information processing systems* (pp. 2672-2680).