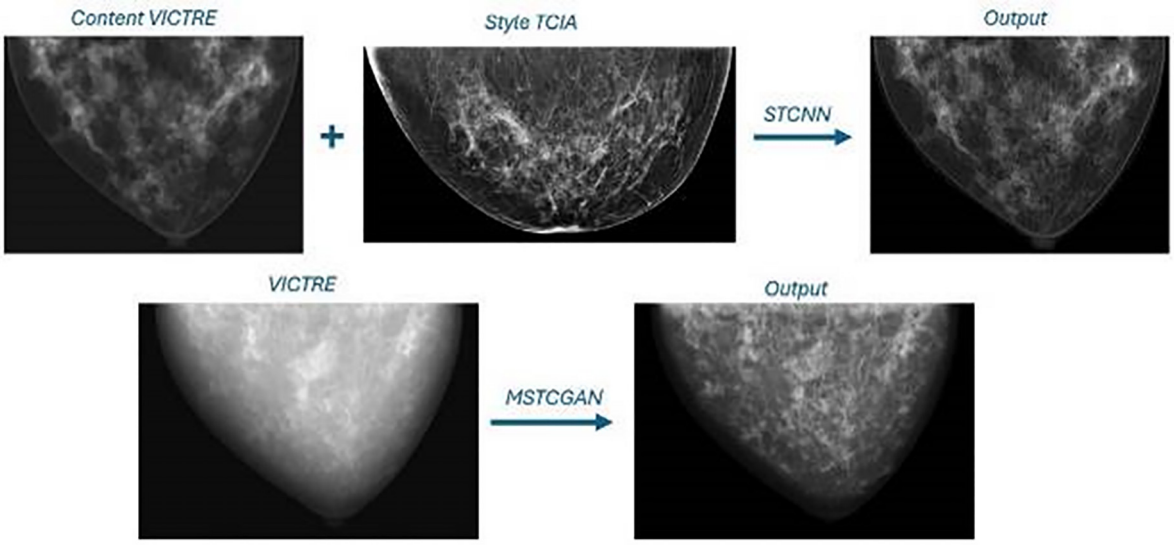

Figure 1 (abstract PP02.13): Examples of application of the STCNN (top) and MSTCGAN (bottom) methods on synthetic images generated with VICTRE.

PP02.13
GENERATION OF SYNTHETIC IMAGES FOR MAMMOGRAPHY VIA NEURAL NETWORKS BASED METHODS

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Introduction: Synthetic data are currently playing a key role in the application of Artificial Intelligence (AI) to medical imaging, enabling the generation of large virtual patients' databases, for the reliable training and validation of AI tools [1]. Here, we explore non-standard techniques for data augmentation of mammographic images for breast cancer detection, by coupling *in silico* computational models with two neural networks (NN) based methods.
Materials & Methods: The synthetic mammographic images are first generated with VICTRE, an in silico tool developed by Food and Drug Administration, for simulating the entire breast imaging pipeline [2]. To improve the image realism, we apply two methods for data transformation, namely a style transfer method using convolutional neural networks (STCNN) [3] and a multi-style transfer method using cycle generative adversarial networks (MSTCGAN) [4]. The real images for the style representation come from The Cancer Imaging Archive (TCIA) open-access database [5].
Results: By means of the two NN methods for data augmentation, we transfer the style from a specific image (STCNN) or an image dataset (MSTCGAN) to an input content image, generated with VICTRE. As an example, Figure 1 shows the image outputs resulting from the application of STCNN (top) and MSTCGAN (bottom).
Summary: The applied NN methods allow us to enhance the realism of the simulated mammographic images, making more evident the anatomical breast structure appearance. Further improvements can be achieved by training these methods on larger amount of data, categorized in terms of breast density percentage and acquisition machine.
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Appendix: (figure or table)

References:

[1] Abadi E., Segars W. P., Tsui B. M. W., Kinahan P. E., Bottenus N., Frangi A. F., Maidment A., Lo J., & Samei E. Virtual clinical trials in medical imaging: a review. Journal of Medical Imaging (Bellingham, Wash.), 2020; 7(4), 042805.
[2] Badal A., Sharma D., Graff C. G., Zeng R., & Badano A. Mammography and breast tomosynthesis simulator for virtual clinical trials. *Comput. Phys. Commun*. 2021; 261: 107779.
[3] Gatys L. A., Ecker A. S., & Bethge M. Image style transfer using convolutional neural networks. 2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR). 2016.
[4] Li Z., Cui Z., Wang S., Qi Y., Ouyang X., Chen Q., Yang Y., Xue Z., Shen D., & Cheng J.-Z. Domain generalization for mammography detection via multi-style and multi-view contrastive learning. *Medical Image Computing and Computer Assisted Intervention – MICCAI 2021*. Springer International Publishing. 98–108.
[5] Comstock C. E. *et al.* (2023). Abbreviated Breast MRI and Digital Tomosynthesis Mammography in Screening Women With Dense Breasts (EA1141) (Version 1) [dataset]. *The Cancer Imaging Archive*. https://doi.org/10.7937/2BAS-HR33

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PP02.14
PREDICTING TREATMENT RESPONSE IN HODGKIN'S LYMPHOMA PATIENTS USING DECISION TREE ALGORITHM AND EXPLAINABLE AI METHODS

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Introduction: Hodgkin's lymphoma (HL) is a curable cancer. Personalized treatment approaches are crucial for effective care and