# SPADE

From ChatGPT (just to understand what it is):

In the context of Generative Adversarial Networks (GANs), SPADE stands for "Spatially-Adaptive Denormalization". SPADE is a normalization technique used in GANs that is designed to preserve spatial information while allowing for greater flexibility in the generator network.

In traditional normalization techniques, such as batch normalization, the statistics used to normalize the data are calculated globally over the entire batch of images. This can lead to a loss of spatial information because the same statistics are applied to every pixel in every image. SPADE, on the other hand, calculates normalization statistics for each pixel location individually, allowing for more precise adjustments and preserving more spatial information.

SPADE works by learning a set of normalization parameters for each pixel location in the image, which are used to denormalize the feature maps produced by the generator network. These parameters are learned by a separate network that takes in the semantic label map of the image as input and outputs the normalization parameters.

Overall, SPADE is a useful technique in GANs because it allows for more precise control over the generator network, resulting in higher-quality generated images with better spatial information.

Maybe this github helps for the gan:

* <https://github.com/NVlabs/SPADE/tree/master/models/networks>
* PAPER: <https://www.researchgate.net/publication/338511887_Semantic_Image_Synthesis_With_Spatially-Adaptive_Normalization>

Implementing SPADE blocks with fastai (I think lars already tried this):

<https://towardsdatascience.com/implementing-spade-using-fastai-6ad86b94030a>

SPADE block:

<https://kushaj.medium.com/spade-state-of-the-art-in-image-to-image-translation-by-nvidia-bb49f2db2ce3>