Advanced Topics in ML - Assignment 2: Annex

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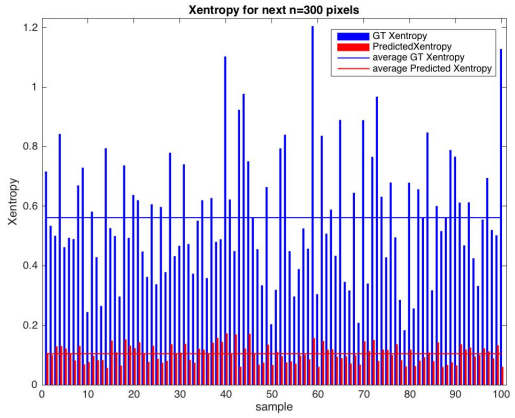
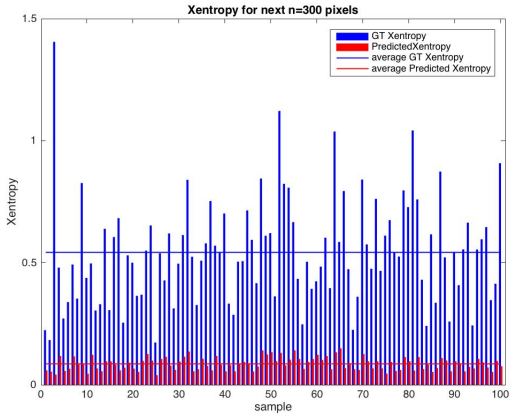
1 Part2 - b) In-painting

1.1 Part2 - b) Cross-entropy

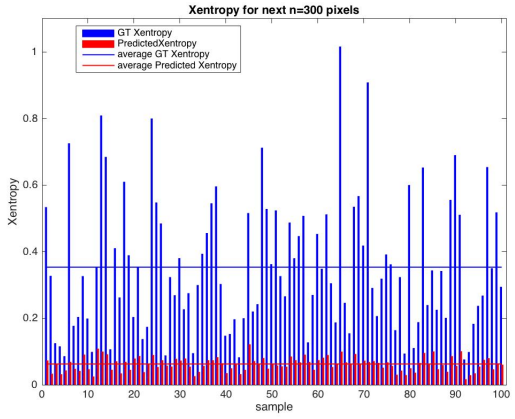
Figures 1 to 4, we plot the average cross-entropy over the 10 generated sequences for the next $n \in [1, 10, 28, 300]$ pixels for each of the 100 cache images for each of the four models.



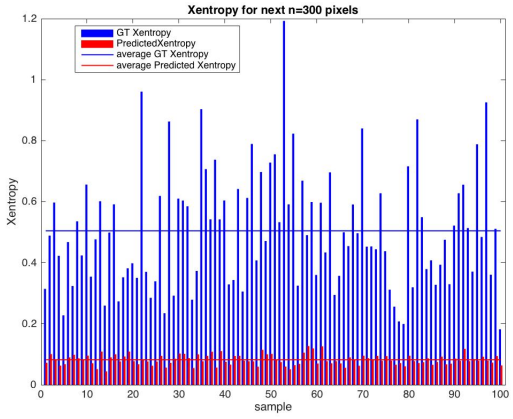
(a) GRU 1 layer 32 units



(b) GRU 1 layer 64 units

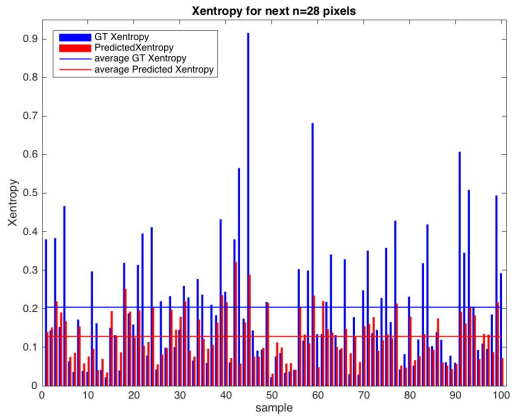


(c) GRU 1 layer 128 units

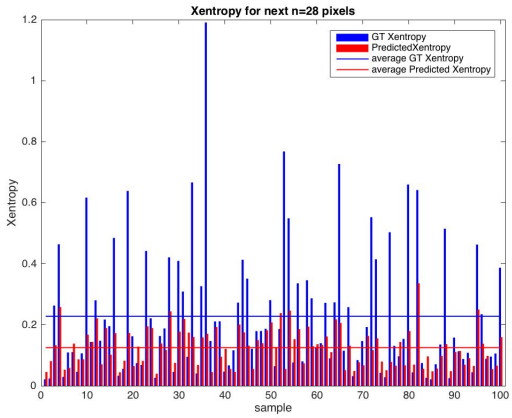


(d) GRU 3 layers 32 units

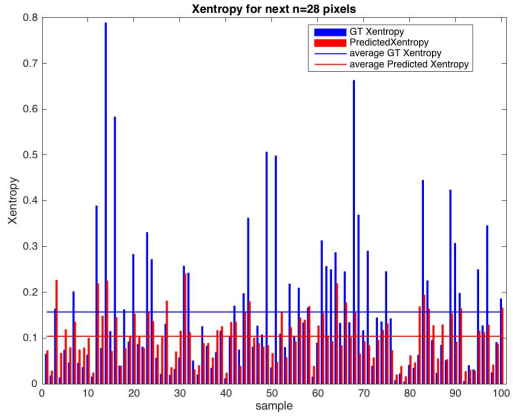
Figure 1: Cross entropy for the 100 continuation sequences for the next n=300 pixels, averaged over 10 samples.



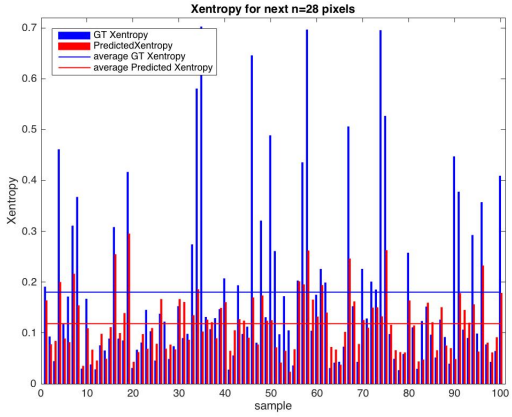
(a) GRU 1 layer 32 units



(b) GRU 1 layer 64 units

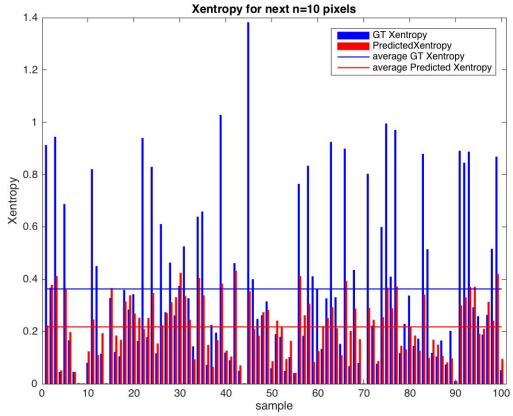


(c) GRU 1 layer 128 units

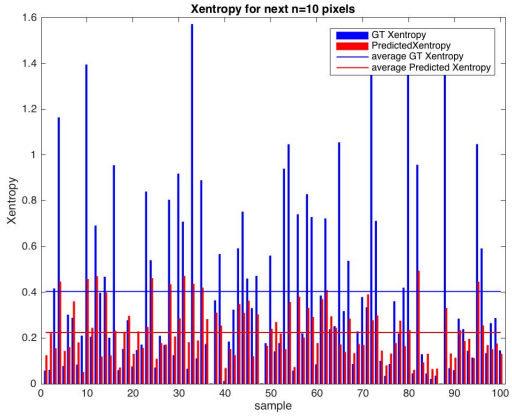


(d) GRU 3 layers 32 units

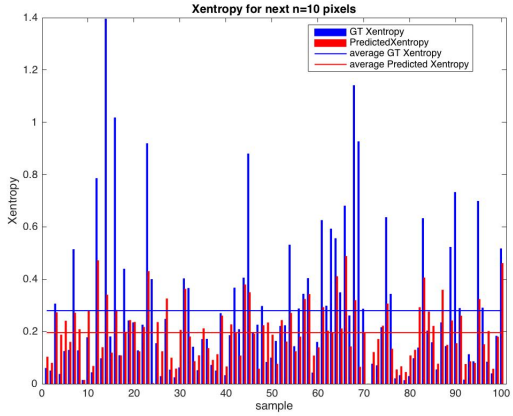
Figure 2: Cross entropy for the 100 continuation sequences for the next n=28 pixels, averaged over 10 samples.



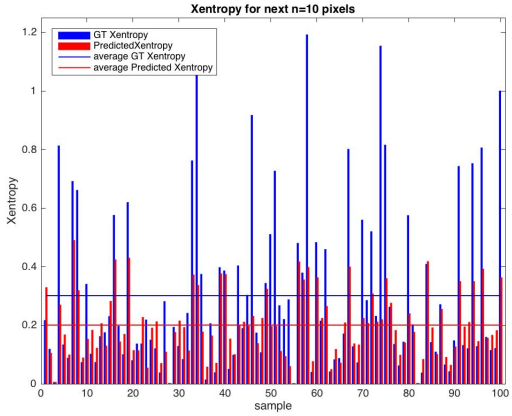
(a) GRU 1 layer 32 units



(b) GRU 1 layer 64 units

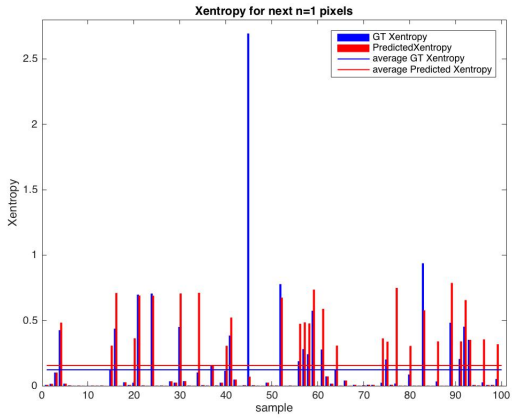


(c) GRU 1 layer 128 units

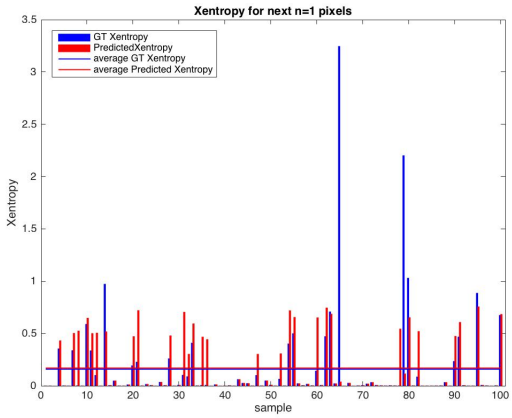


(d) GRU 3 layers 32 units

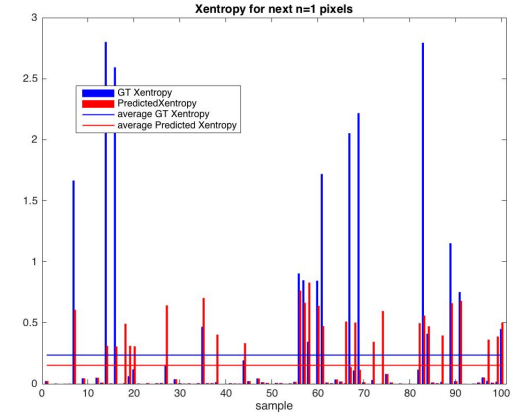
Figure 3: Cross entropy for the 100 continuation sequences for the next n=10 pixels, averaged over 10 samples.



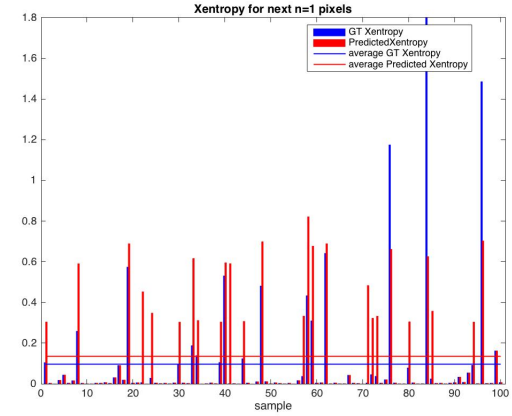
(a) GRU 1 layer 32 units



(b) GRU 1 layer 64 units



(c) GRU 1 layer 128 units



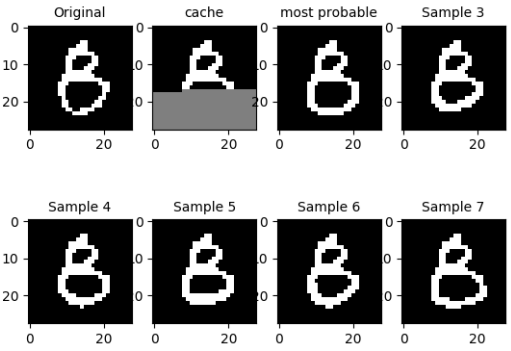
(d) GRU 3 layers 32 units

Figure 4: Cross entropy for the 100 continuation sequences for the next n=1 pixel1, averaged over 10 samples.

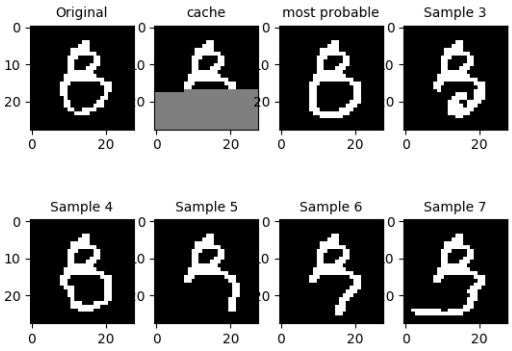
1.2 Part2 - b) Visualization

In-painting visualizations for the different models and continuation sequence lengths.

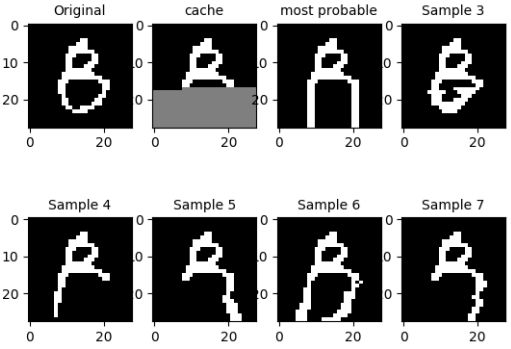
1.2.1 Part2 - b) Visualization - 300 pixels



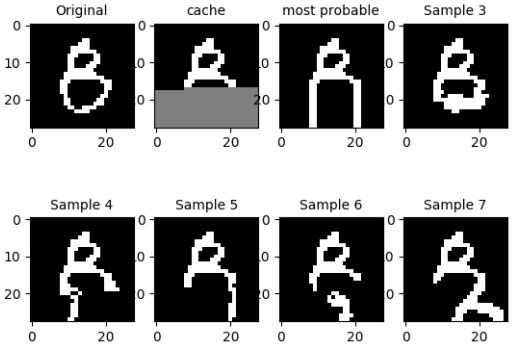
(a) 1 layer 128 units model



(b) 3 layers 32 units model

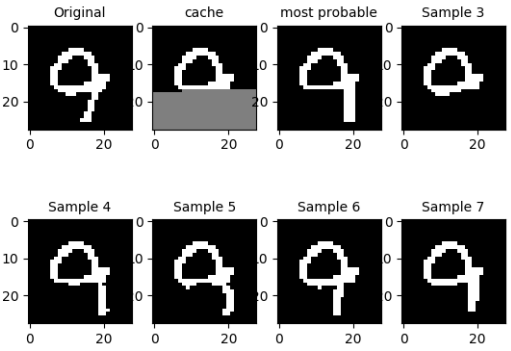


(c) 1 layer 64 units model

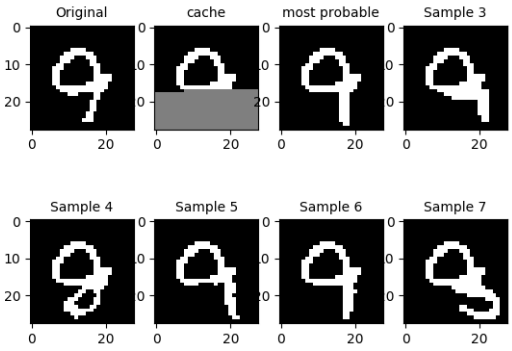


(d) 1 layer 32 units model

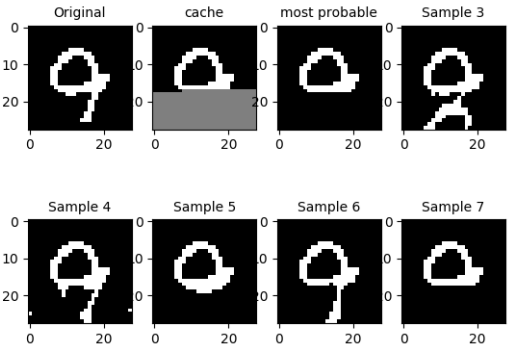
Figure 5: Continuation sequence generation for n=300 pixels for the four different models. First image of the mini-serie is the original image, second one is the cache data and third one is the most probable continuation sequence. This example is successfully in-painted by 1 layer 128 units (top-left), while in-painted with high variance between samples for 3 layers 32 units (top-right). 1 layer 64 and 32 units (bottom-left and bottom right) failed to in-paint this example



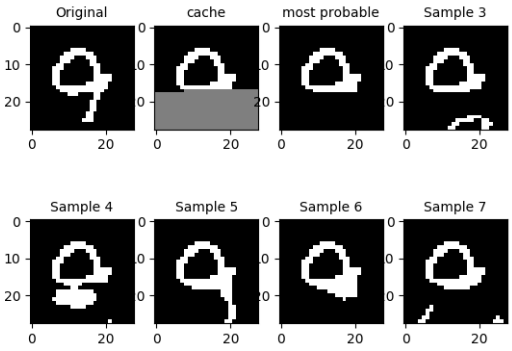
(a) 1 layer 128 units model



(b) 3 layers 32 units model

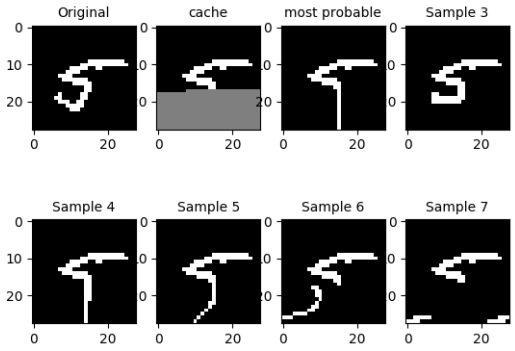


(c) 1 layer 64 units model

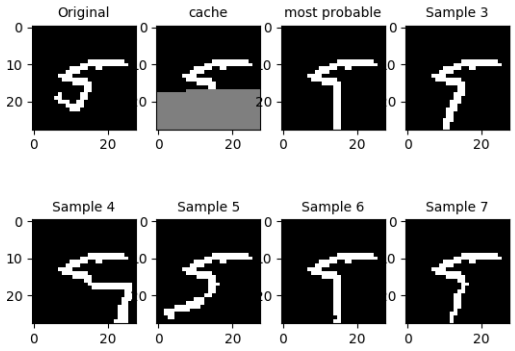


(d) 1 layer 32 units model

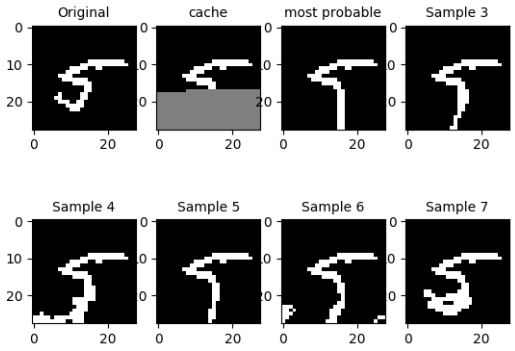
Figure 6: Continuation sequence generation for n=300 pixels for the four different models. First image of the mini-serie is the original image, second one is the cache data and third one is the most probable continuation sequence. This example is in-painted with high-variance between samples by 1 layer 128 units (top-left) and 3 layers 32 units (top-right). 1 layer 64 and 32 units (bottom-left and bottom-right) failed to in-paint this example



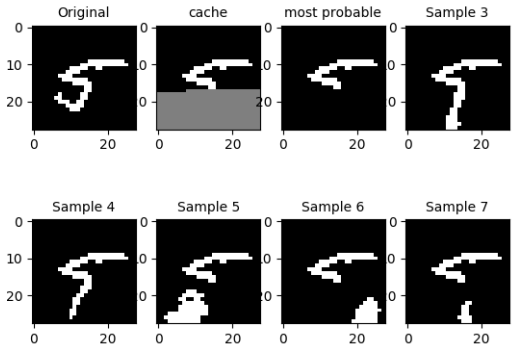
(a) 1 layer 128 units model



(b) 3 layers 32 units model



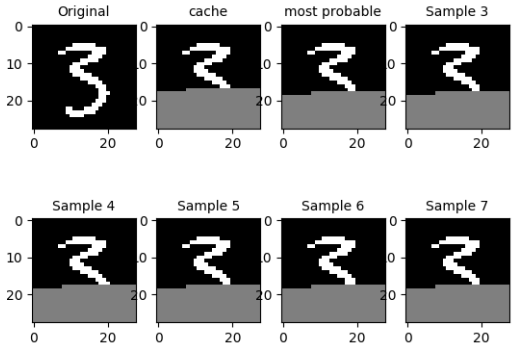
(c) 1 layer 64 units model



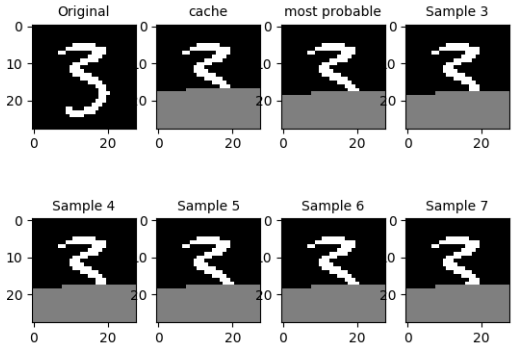
(d) 1 layer 32 units model

Figure 7: Continuation sequence generation for n=300 pixels for the four different models. First image of the mini-serie is the original image, second one is the cache data and third one is the most probable continuation sequence. All the four models failed to in-paint this example.

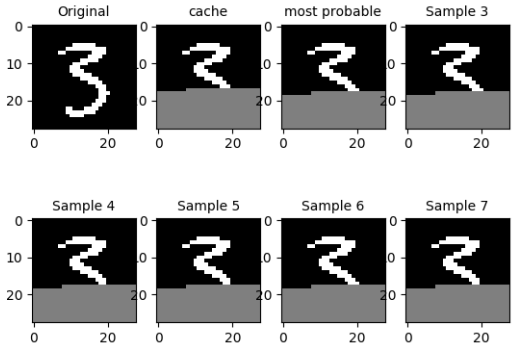
1.2.2 Part2 - b) Visualization - 28 pixels



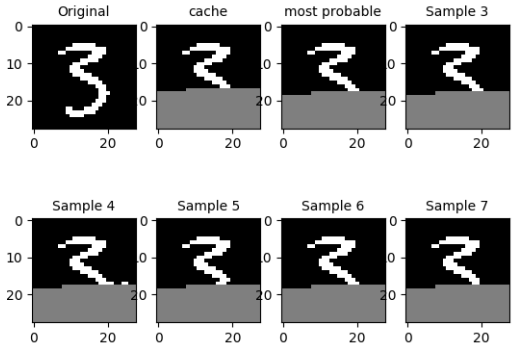
(a) 1 layer 128 units model



(b) 3 layers 32 units model

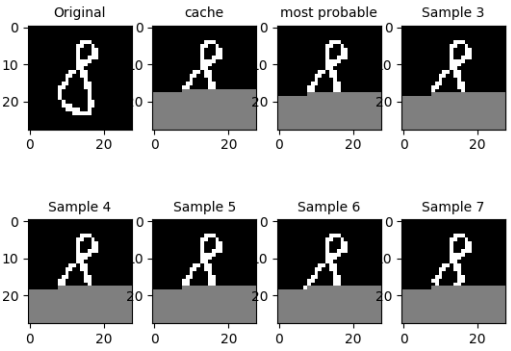


(c) 1 layer 64 units model

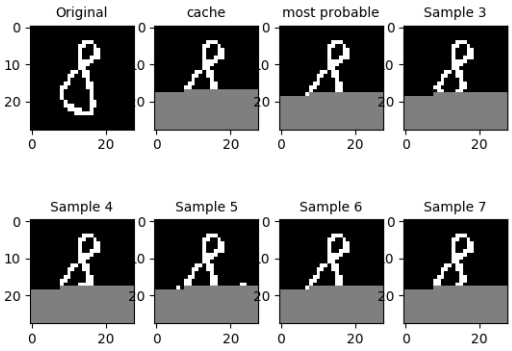


(d) 1 layer 32 units model

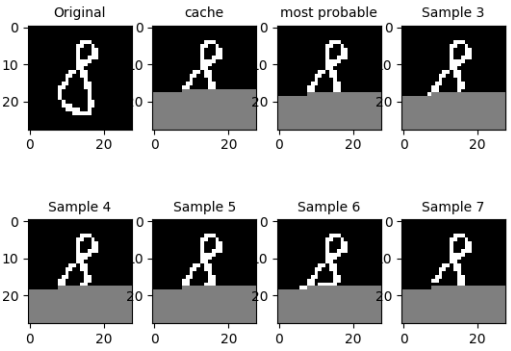
Figure 8: Continuation sequence generation for n=28 pixels for the four different models. First image of the mini-serie is the original image, second one is the cache data and third one is the most probable continuation sequence. All the models successfully in-painted this example



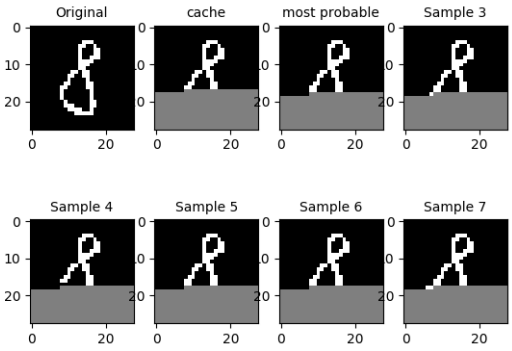
(a) 1 layer 128 units model



(b) 3 layers 32 units model

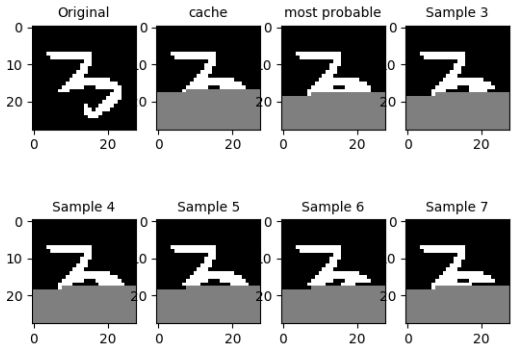


(c) 1 layer 64 units model

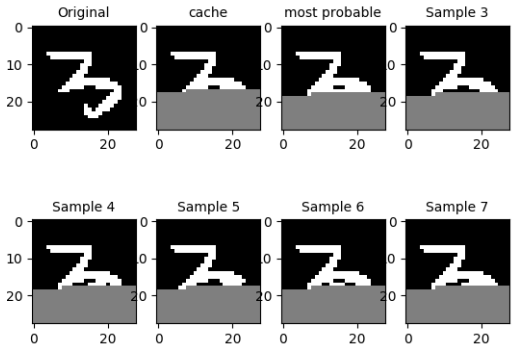


(d) 1 layer 32 units model

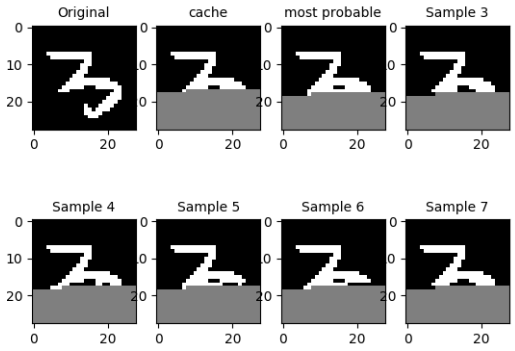
Figure 9: Continuation sequence generation for n=28 pixels for the four different models. First image of the mini-serie is the original image, second one is the cache data and third one is the most probable continuation sequence. All the models have in-painted this example with high variance between samples, with in some case, failed predictions (sample 5, 3 layers 32 units model (top-right); sample 7, 1 layers 64 units model (bottom-left); etc.).



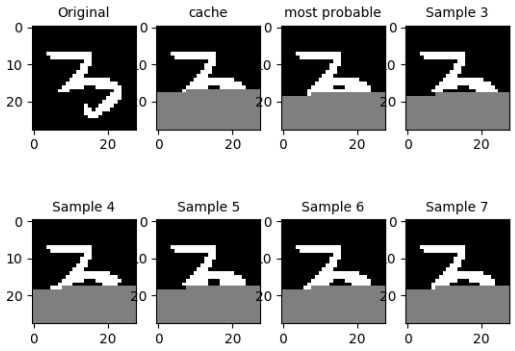
(a) 1 layer 128 units model



(b) 3 layers 32 units model



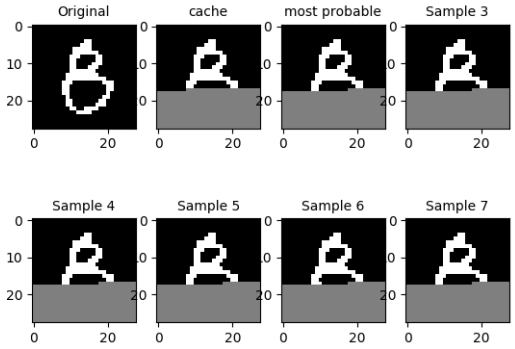
(c) 1 layer 64 units model



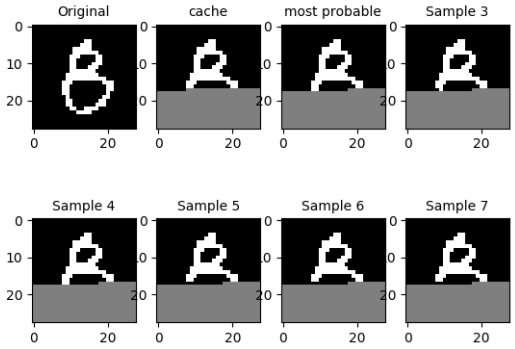
(d) 1 layer 32 units model

Figure 10: Continuation sequence generation for n=28 pixels for the four different models. First image of the mini-serie is the original image, second one is the cache data and third one is the most probable continuation sequence. All the models have failed to in-paint this example.

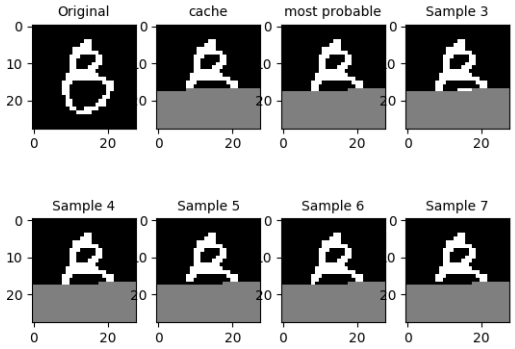
1.2.3 Part2 - b) Visualization - 10 pixels



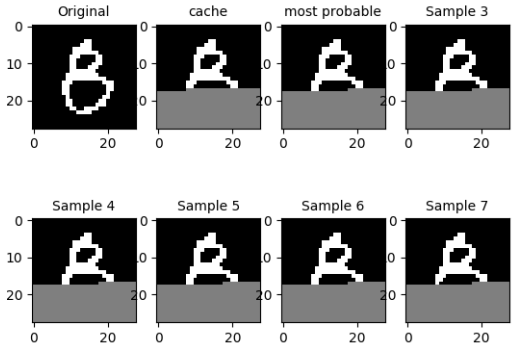
(a) 1 layer 128 units model



(b) 3 layers 32 units model

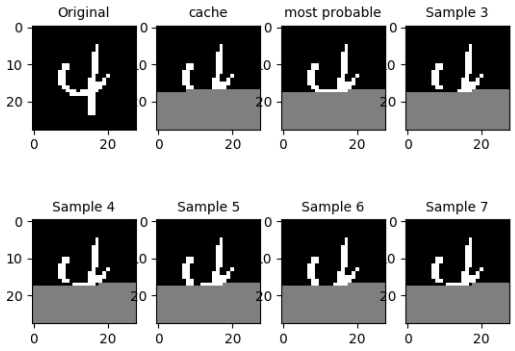


(c) 1 layer 64 units model

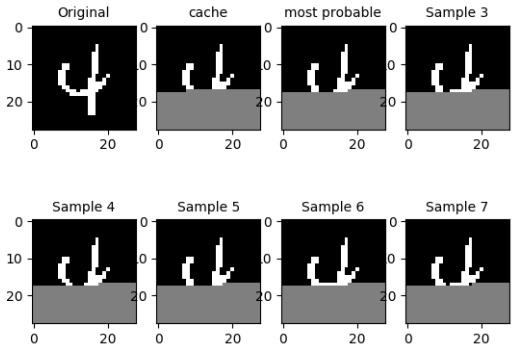


(d) 1 layer 32 units model

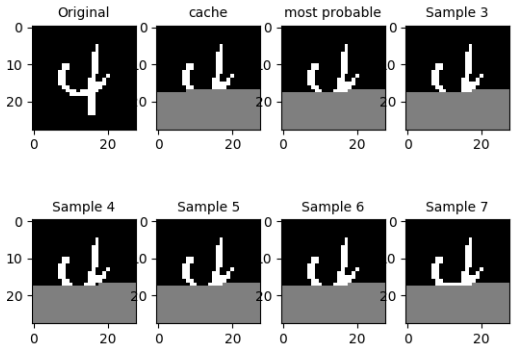
Figure 11: Continuation sequence generation for n=10 pixels for the four different models. First image of the mini-serie is the original image, second one is the cache data and third one is the most probable continuation sequence. Models 1 layer 128 units (top-left) and 1 layer 32 units (bottom-right) have in-painted correctly (while with variance between samples) this example. Models 3 layers 32 units (top-right) and 1 layer 64 (bottom-left) units have failed or in-painted this example with high variance between samples.



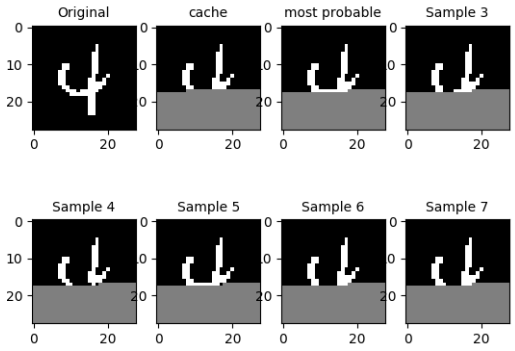
(a) 1 layer 128 units model



(b) 3 layers 32 units model

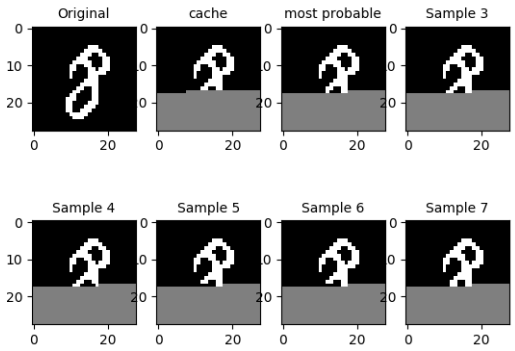


(c) 1 layer 64 units model

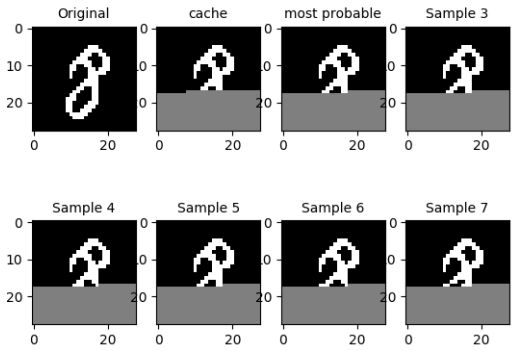


(d) 1 layer 32 units model

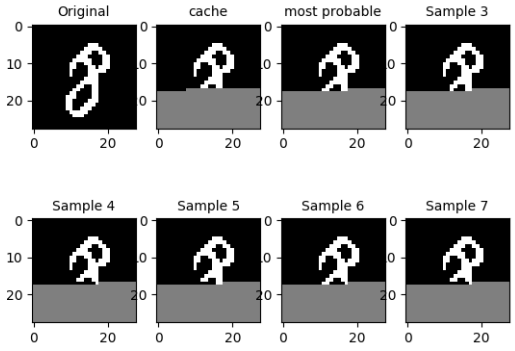
Figure 12: Continuation sequence generation for n=10 pixels for the four different models. First image of the mini-serie is the original image, second one is the cache data and third one is the most probable continuation sequence. This in-painting have been done for all models with high variance between samples.



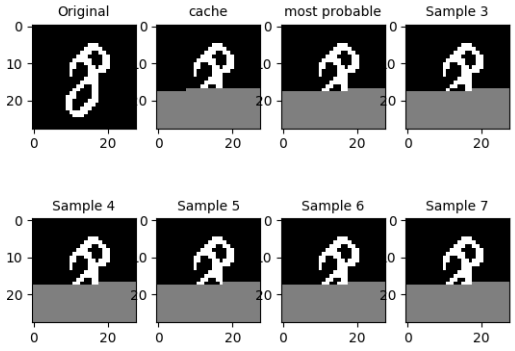
(a) 1 layer 128 units model



(b) 3 layers 32 units model



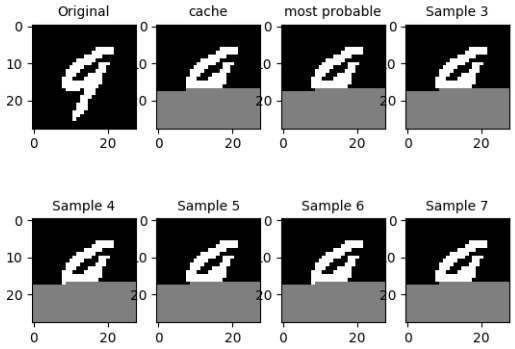
(c) 1 layer 64 units model



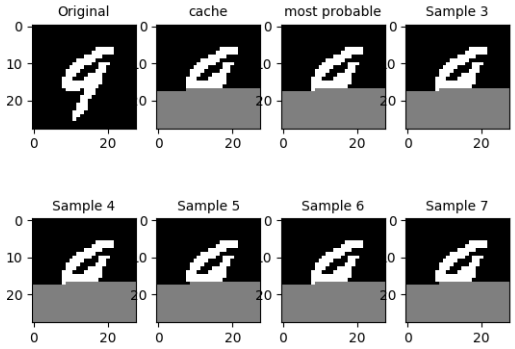
(d) 1 layer 32 units model

Figure 13: Continuation sequence generation for n=10 pixels for the four different models. First image of the mini-serie is the original image, second one is the cache data and third one is the most probable continuation sequence. This example has been in-painted with high variance between samples. Some samples present wrong in-painting such as sample 6, 1 layer 128 units (top-left) or sample 5, 1 layer 64 units (bottom-left).

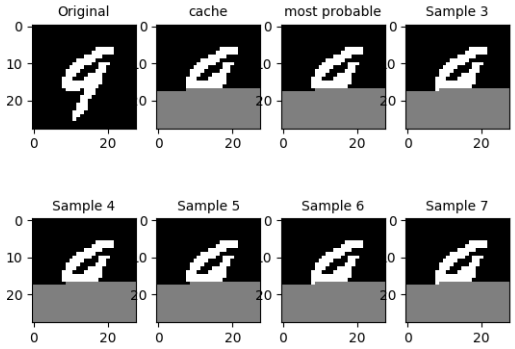
1.2.4 Part2 - b) Visualization - 1 pixels



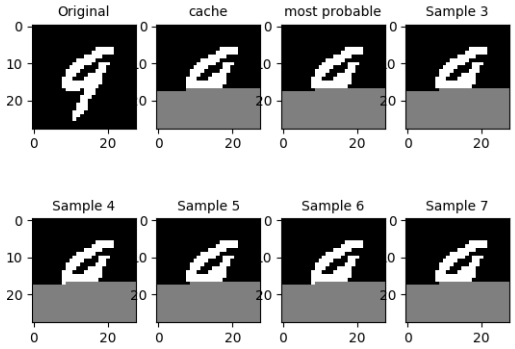
(a) 1 layer 128 units model



(b) 3 layers 32 units model



(c) 1 layer 64 units model



(d) 1 layer 32 units model

Figure 14: Continuation sequence generation for n=1 pixels for the four different models, using the most probable sampling. First image of the mini-serie is the original image, second one is the cache data and third one is the most probable continuation sequence.