**Final Report**

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* **Abstract**

This final report summarizes all the work I have done in this project. The sequence of this report follows the requirements of the exercise part 1. Due to the limited calculation power of my laptop, I chose to use Google colab to complete all the model writing and running. Also, due to the time limitation of this project, I did not follow the original paper’s model configuration of SSSD4 and CSDI models but reduce the number of iteration and diffusion steps (the model is also converged). Both SSSD4 and CSDI models have been converted into TensorFlow framework and can run successfully. Models’ training and testing are both successfully tested with the unit tests, regression test and integration tests. The training and testing datasets used are the “Mujoco” datasets provided by the paper’s author Alcaraz.

* **Part 1**
* **(a)**

Due to the time limitation and the out-of-memory issue of this project, under the ensuring of the model’s converging, we have reduced some parameters of the original model’s configuration to save more time in both the training and testing.

The reduced parameters include **in the training:** (1) the number of iteration (“n\_iters”) from 150000 to 500. (2) the k missing time steps for each feature across the sample length (“missing\_k”) from 200 to 90 (3) the number of residual layers (“num\_res\_layers”) from 36 to 12; **in the testing:** (1) the number of diffusion steps (“T”) from 200 to 10.

**-The following experiments are under the whole sample diffusion ("only\_generate\_missing" = 0)**

**1. Random missing (“masking” = ”rm”)**

**2. Missing not at random (“masking” = ”mnr”)**

**3. Blackout missing (“masking” = ”bm”)**

**-The following experiments are under the only missing portions of the signal diffusion ("only\_generate\_missing" = 1)**

**1. Random missing (“masking” = ”rm”)**

**2. Missing not at random (“masking” = ”mnr”)**

**3. Blackout missing (“masking” = ”bm”)**

* **(b)**
* **(c)**
* **(d)**
* **(e)**