WSCF 2024

WORKSHOP EN SISTEMAS CIBER-FÍSICOS

SMARTNESS

MTP-NT and Transfer of Reinforcement Learning Models

Rafael Pasquini
FACOM/UFU

Christian Rothenberg
FEEC/UNICAMP

11-12 Nov. 2024

MTP-NT: A Mobile Traffic Predictor Enhanced by Neighboring and Transportation Data

TABLE II

ORIGINAL DATA FROM THE DATAFRAME, SHOWING MULTIPLE SAMPLES WITH THE SAME SQUARE ID AND TIME INTERVAL (IN TIMESTAMP) TO REGISTER CALLS DURING THE MEASUREMENTS (USING THE COUNTRY CODE FEATURE).

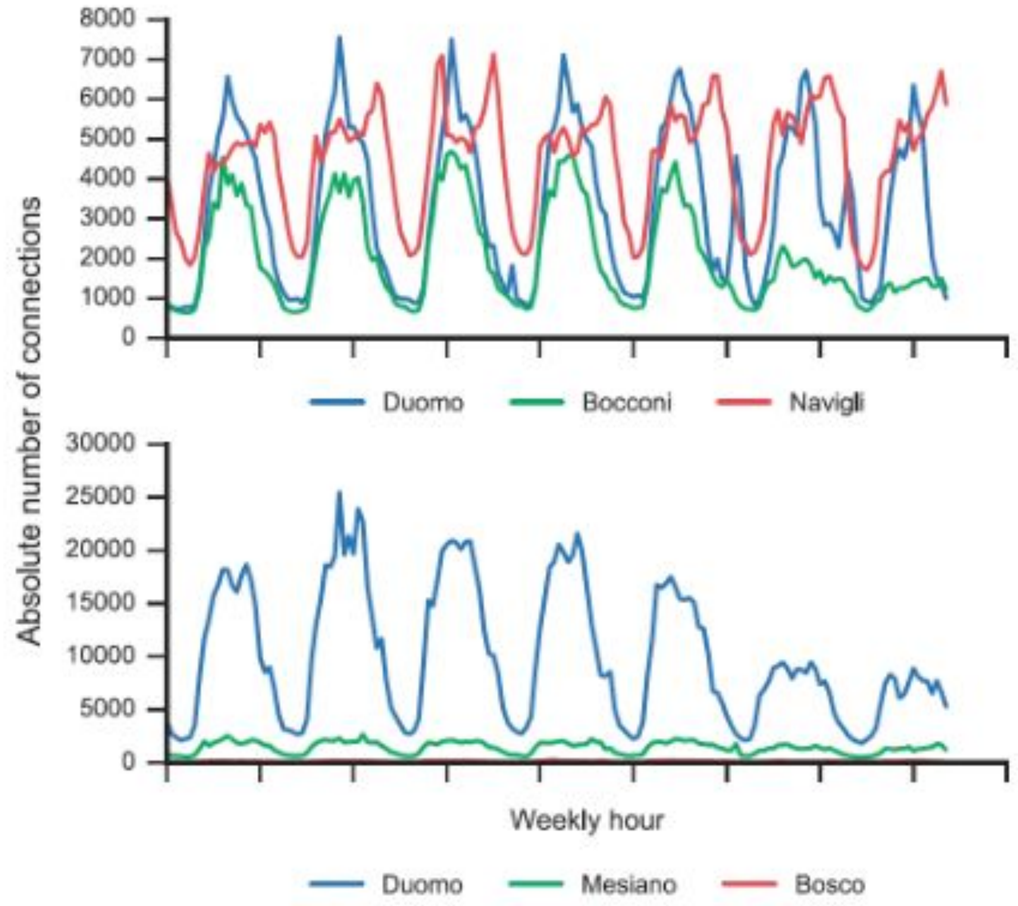
Square id	Time Interval	Country code	SMS-in activity	SMS-out activity	Call-in activity	Call-out activity	Internet traffic activity
1	1383606E+6	0	1.7873E-3	NaN	NaN	NaN	NaN
1	1383606E+6	33	NaN	NaN	NaN	NaN	2.6137E-2
1	1383606E+6	39	8.8512E-2	1.4195E-1	1.0804E-1	2.73E-2	9.2032
10	1383606E+6	33	NaN	NaN	NaN	NaN	2.8653E-2
10	1383606E+6	39	6.7480E-2	1.0631E-1	5.9175E-2	1.0174E-2	5.7891

TABLE III

SAMPLE DATA AFTER THE PREPROCESSING PROCESS.

Square id	Time Interval	Country code	SMS-in activity	SMS-out activity	Call-in activity	Call-out activity	Internet traffic activity
1	1383606E+6	72	9.0299E-2	1.4195E-1	1.0804E-1	2.73E-1	9.2294
10	1383606E+6	72	6.7480E-2	1.0631E-1	5.9175E-2	1.0174E-2	5.8178

MTP-NT: A Mobile Traffic Predictor Enhanced by Neighboring and Transportation Data



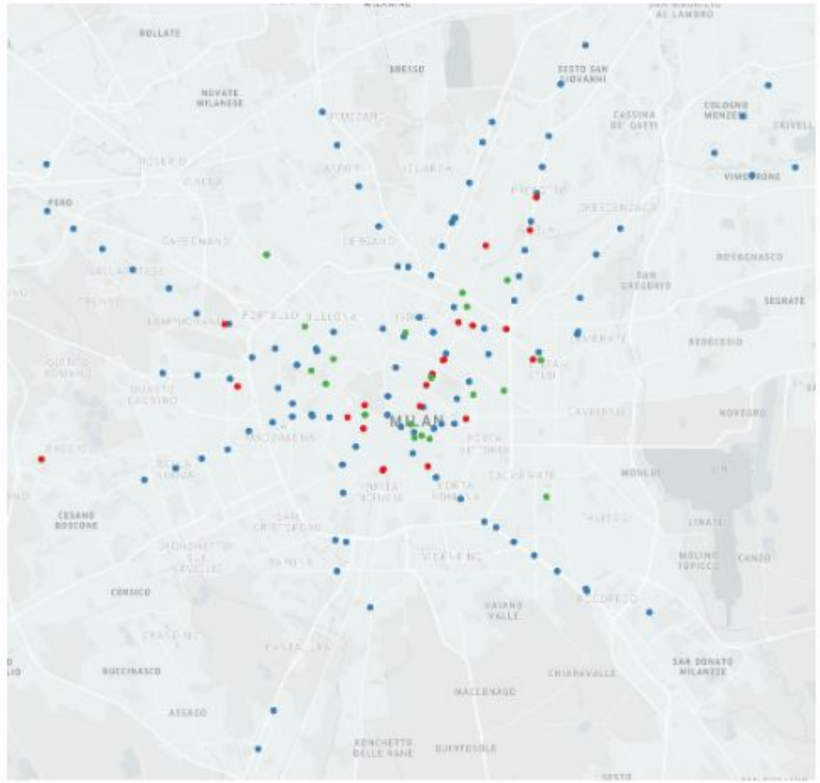
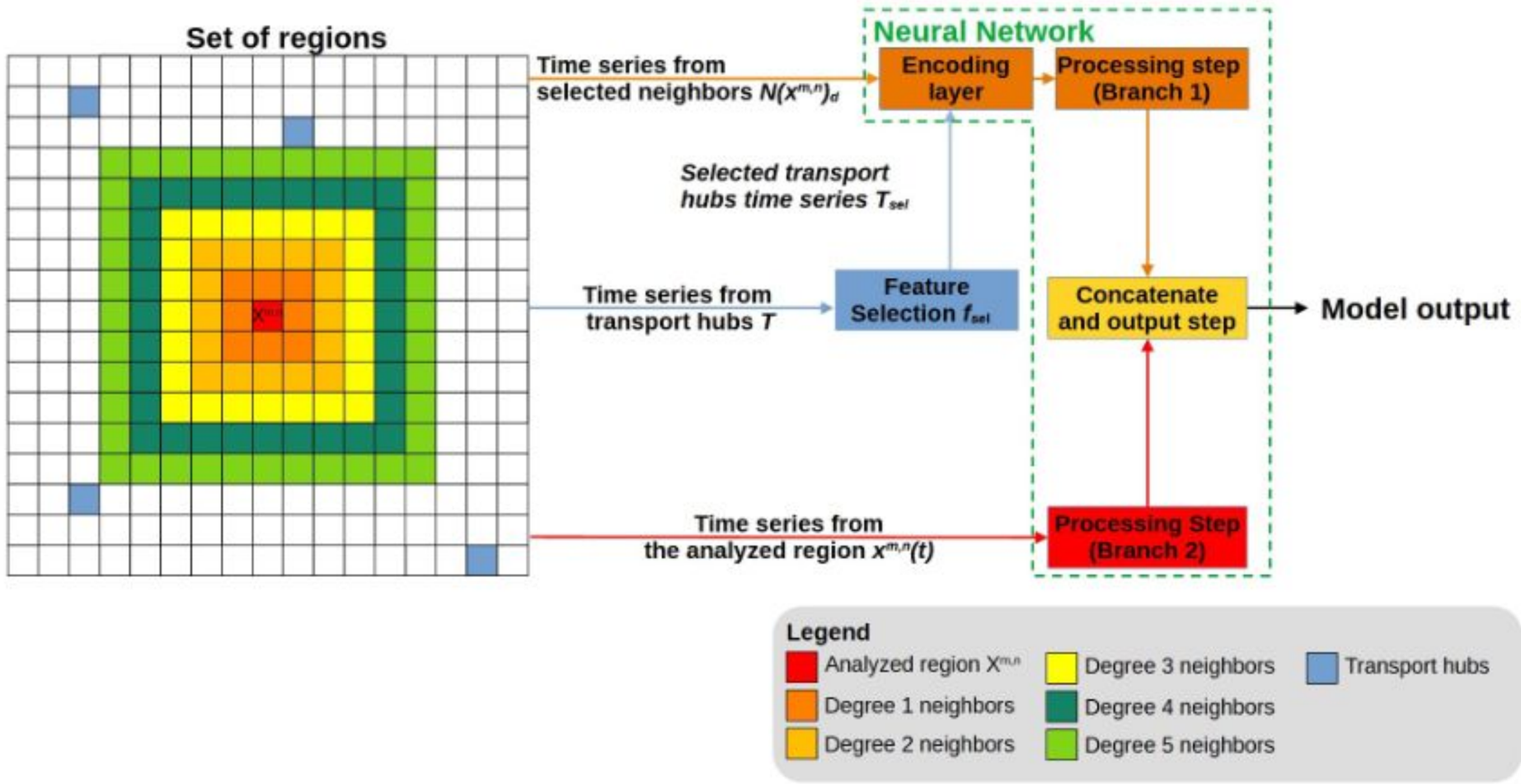
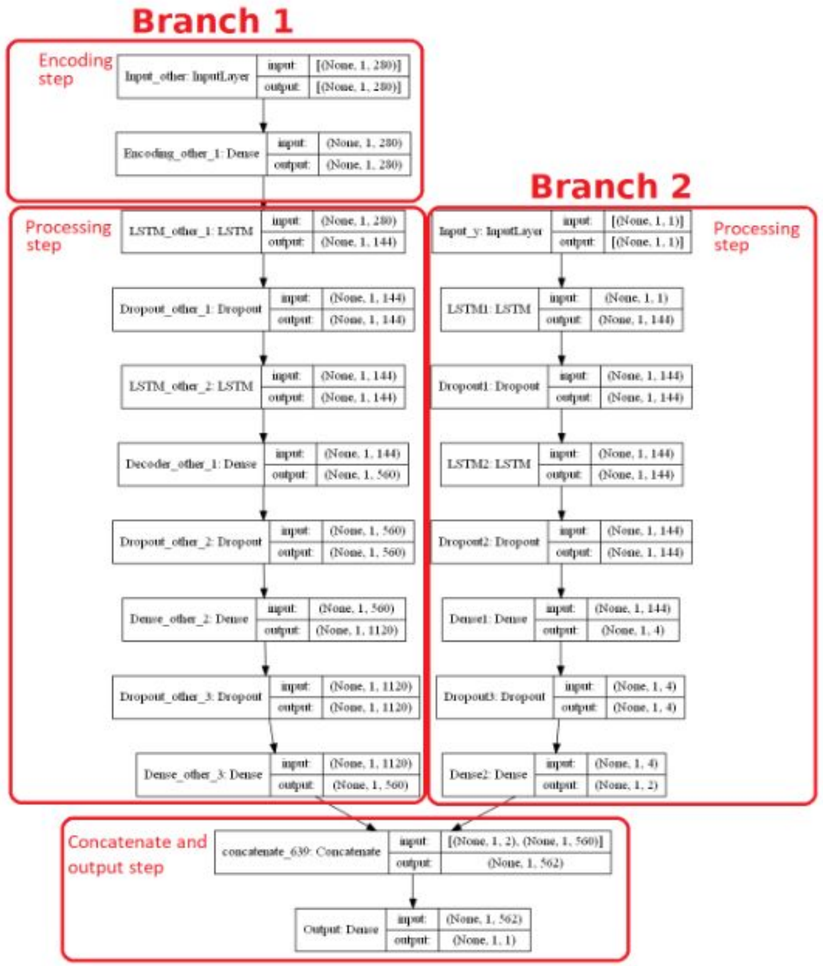


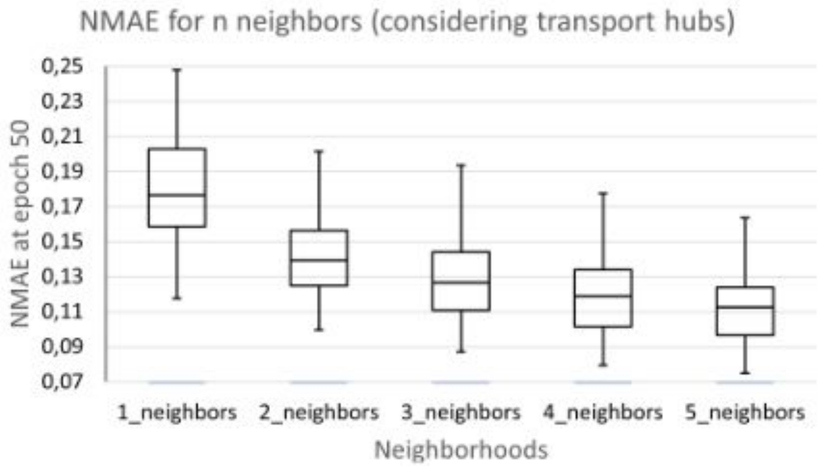
Fig. 2. Mapping of public transport in the city of Milan. In blue, green and red the metro, tram and bus stops, respectively.

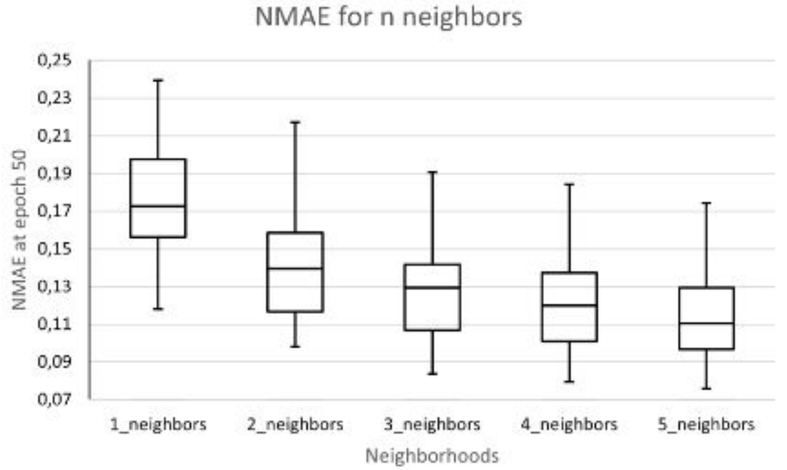
MTP-NT: A Mobile Traffic Predictor Enhanced by Neighboring and Transportation Data



MTP-NT: A Mobile Traffic Predictor Enhanced by Neighboring and Transportation Data







MTP-NT: A Mobile Traffic Predictor Enhanced by Neighboring and Transportation Data

TABLE IV
NUMBER OF REGIONS WITH INCREASING NEIGHBORHOODS.

Number of neighborhoods	1	2	3	4	5
Number of regions	9	25	49	81	121

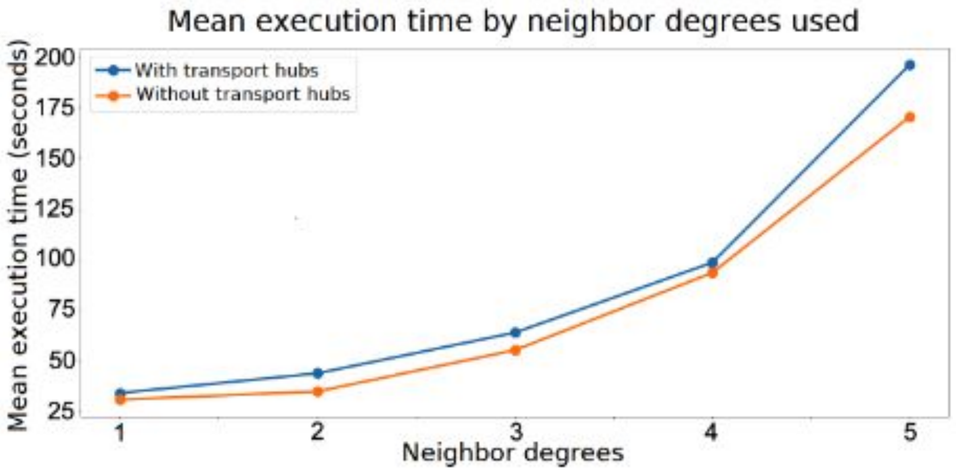


Fig. 11. Execution time for tests with transport hubs and without the additional data, varying the number of neighboring regions considered. As seen, the usage of transport hubs presented a overall time processing increase for the tests.

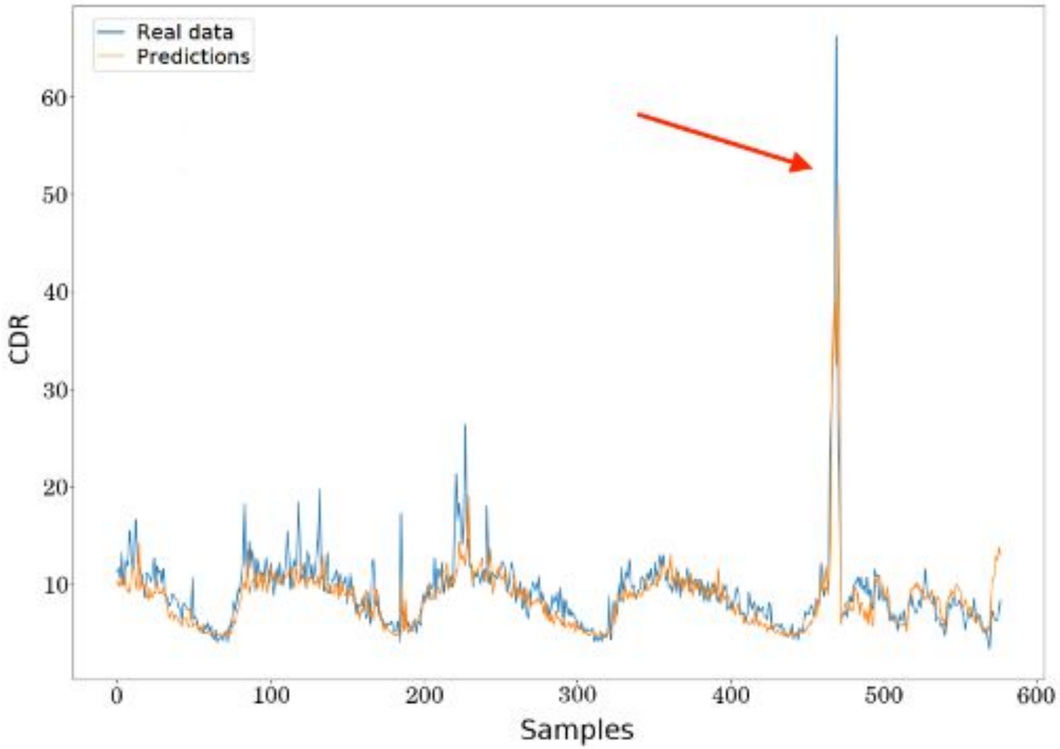
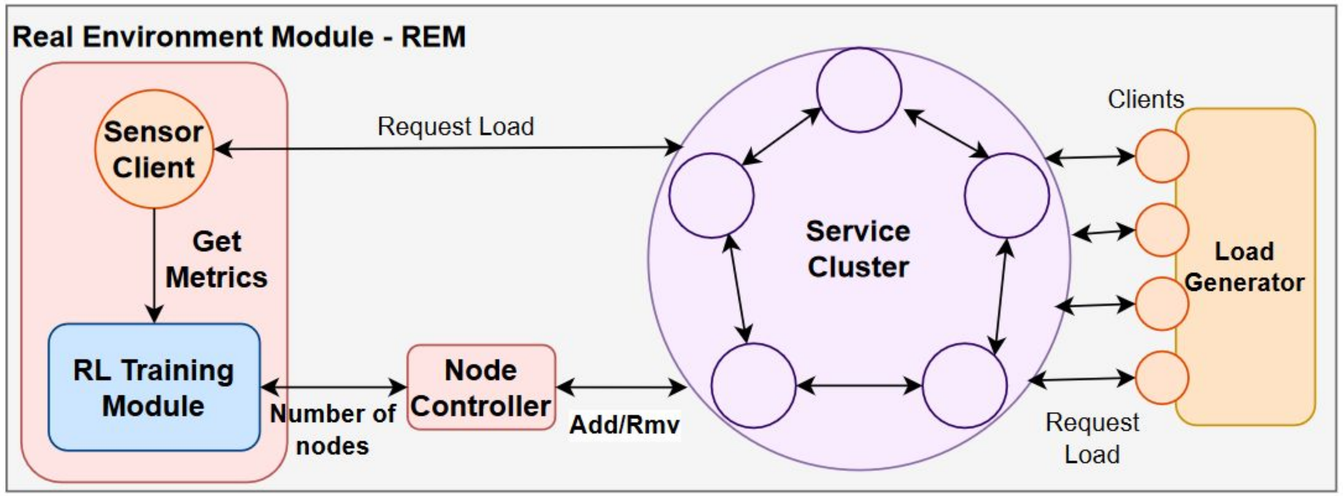
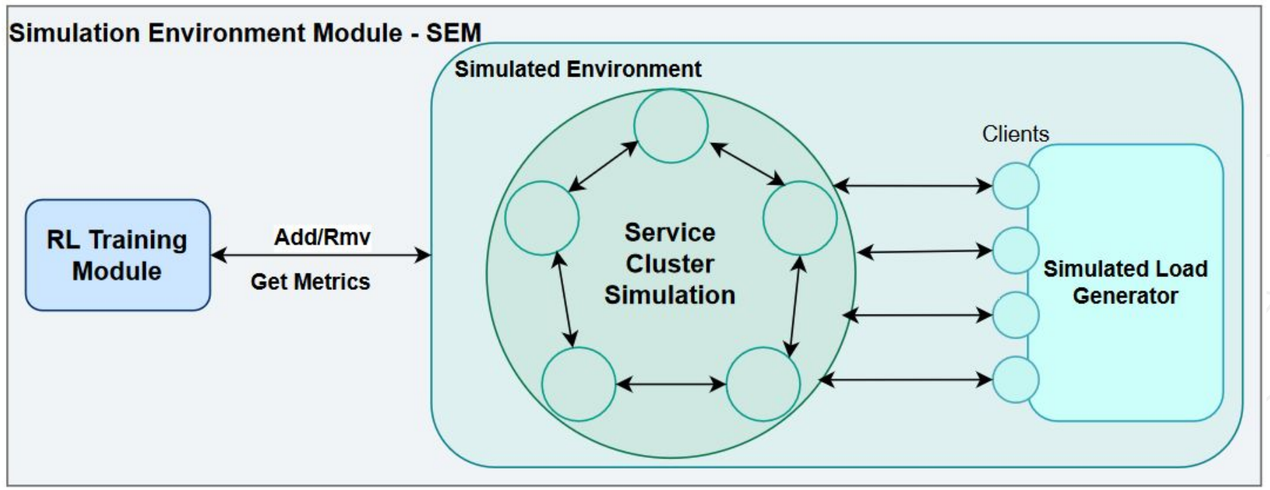


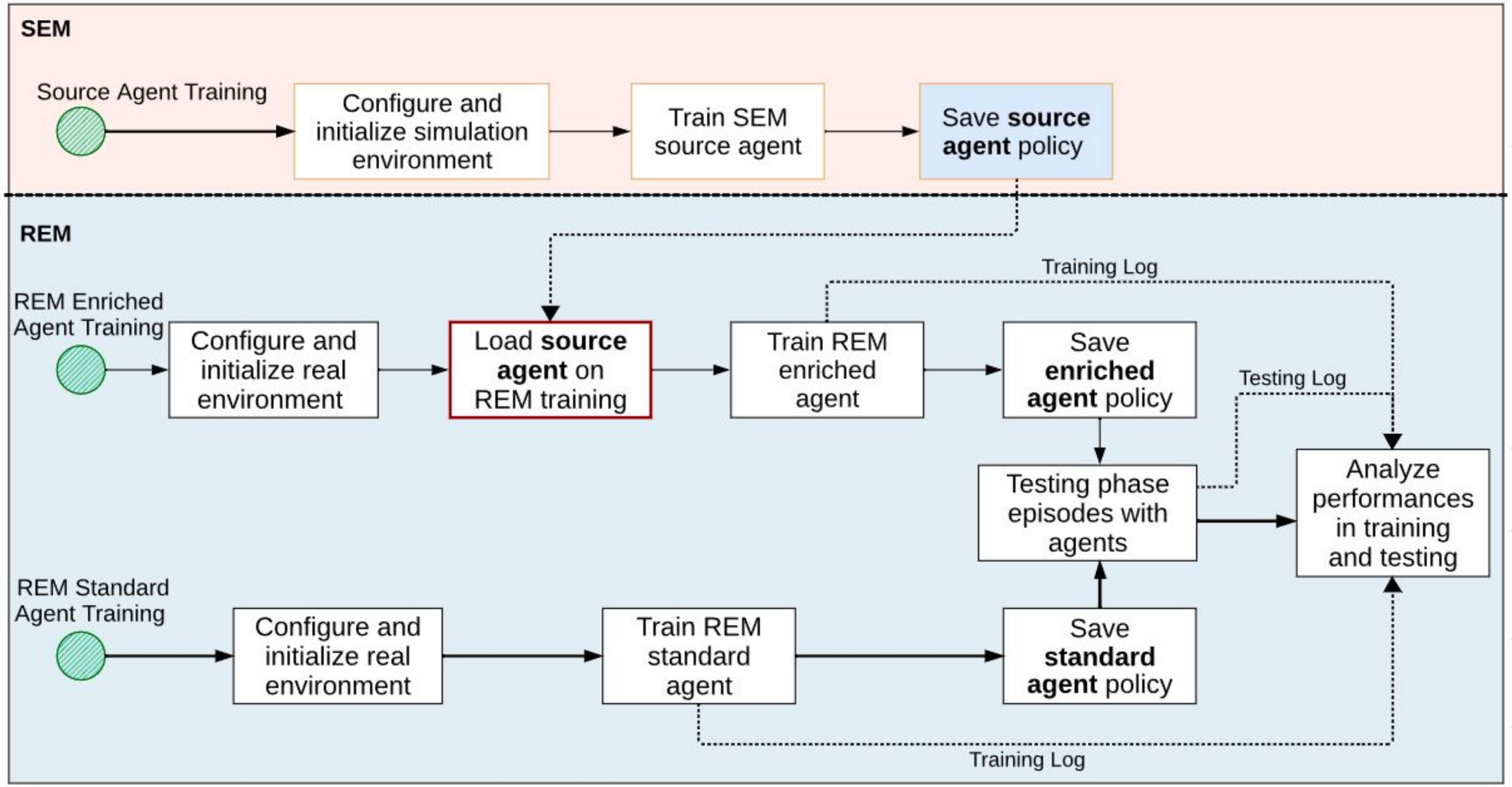
Fig. 13. Plot for San Siro/Giuseppe Meazza BS Station predictions considering transport hubs. In blue the real network usage, in orange the model predictions with the aperiodic peak highlighted.

Transfer of Deep Reinforcement Learning for Cloud Service's Elasticity

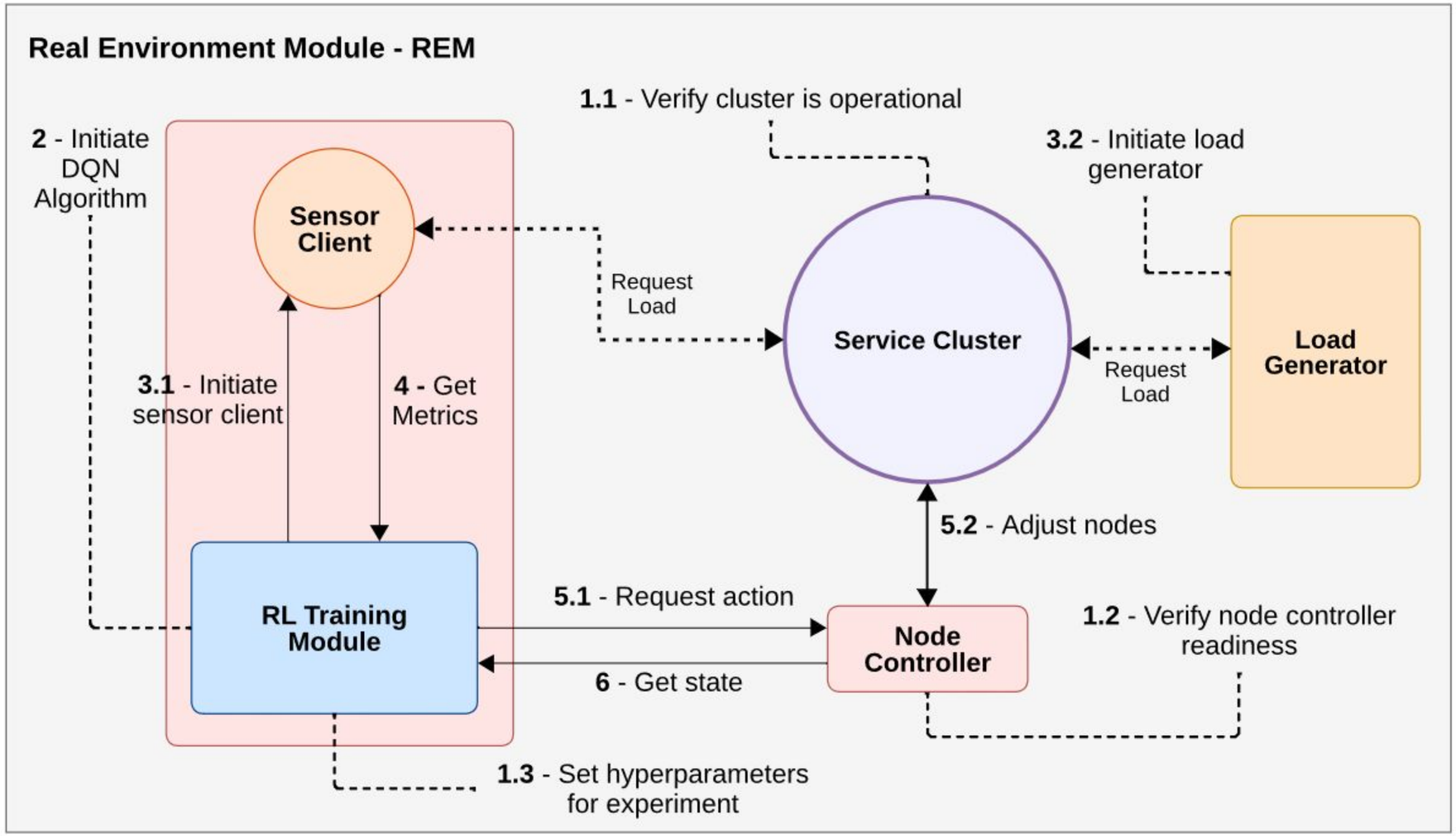




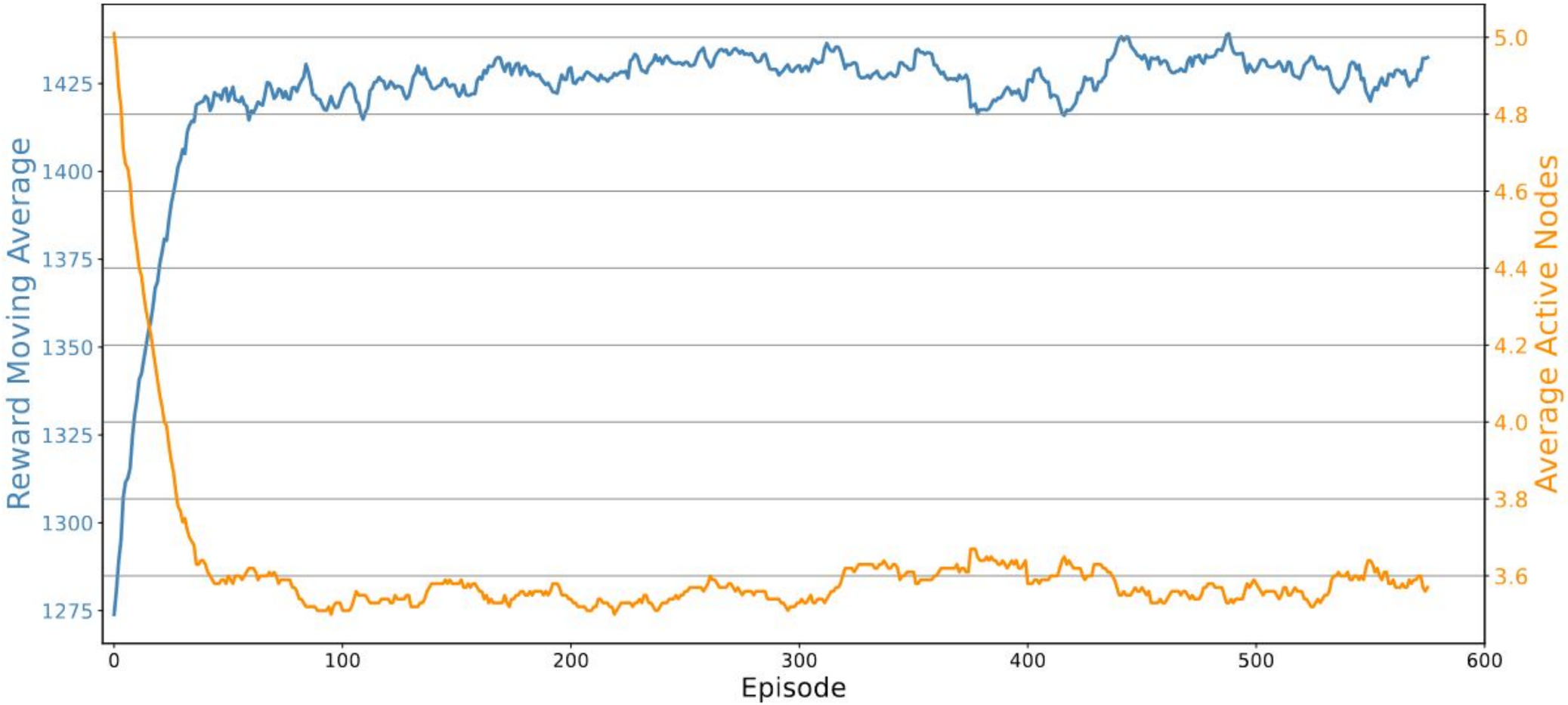
Transfer of Deep Reinforcement Learning for Cloud Service's Elasticity



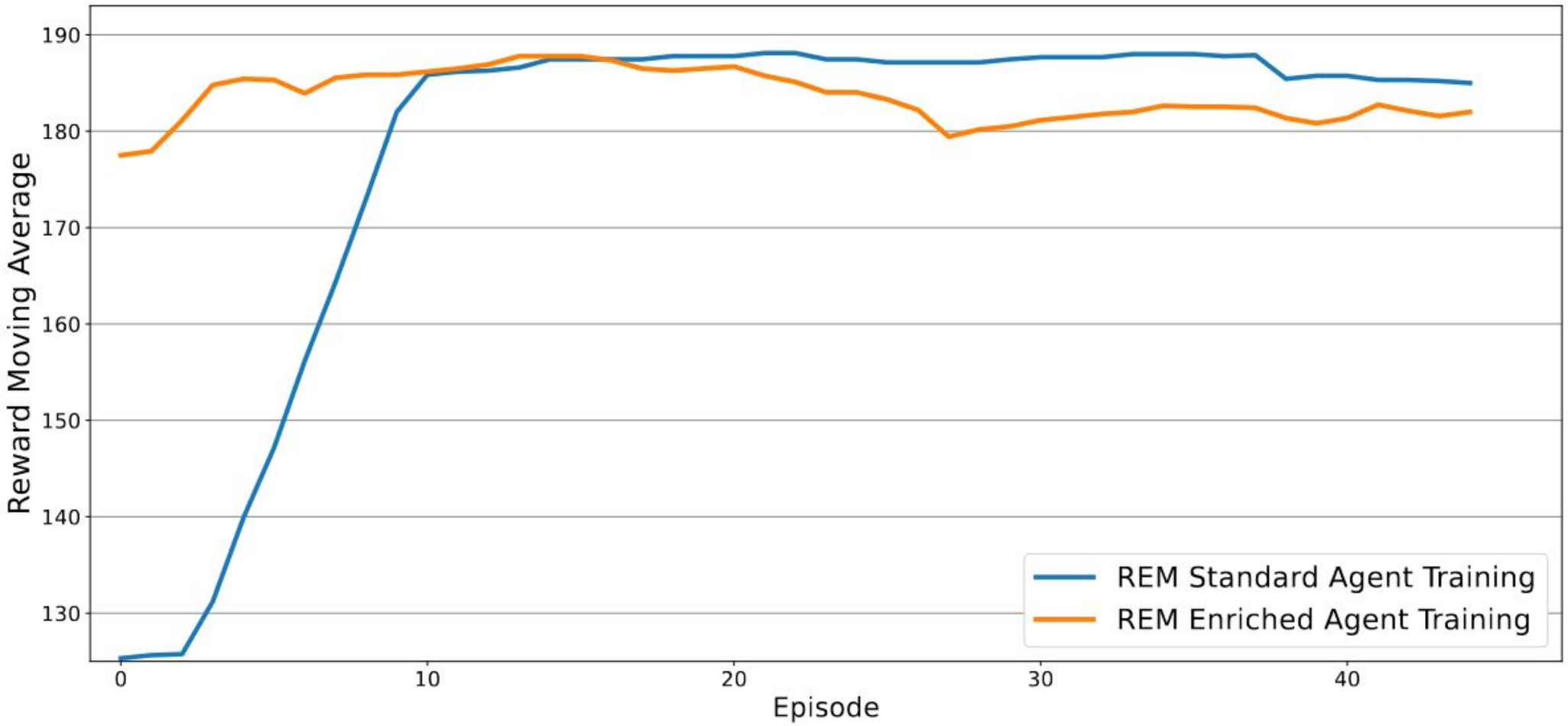
Transfer of Deep Reinforcement Learning for Cloud Service's Elasticity



Transfer of Deep Reinforcement Learning for Cloud Service's Elasticity



Transfer of Deep Reinforcement Learning for Cloud Service's Elasticity



SMARTNESS

SMARTNESS