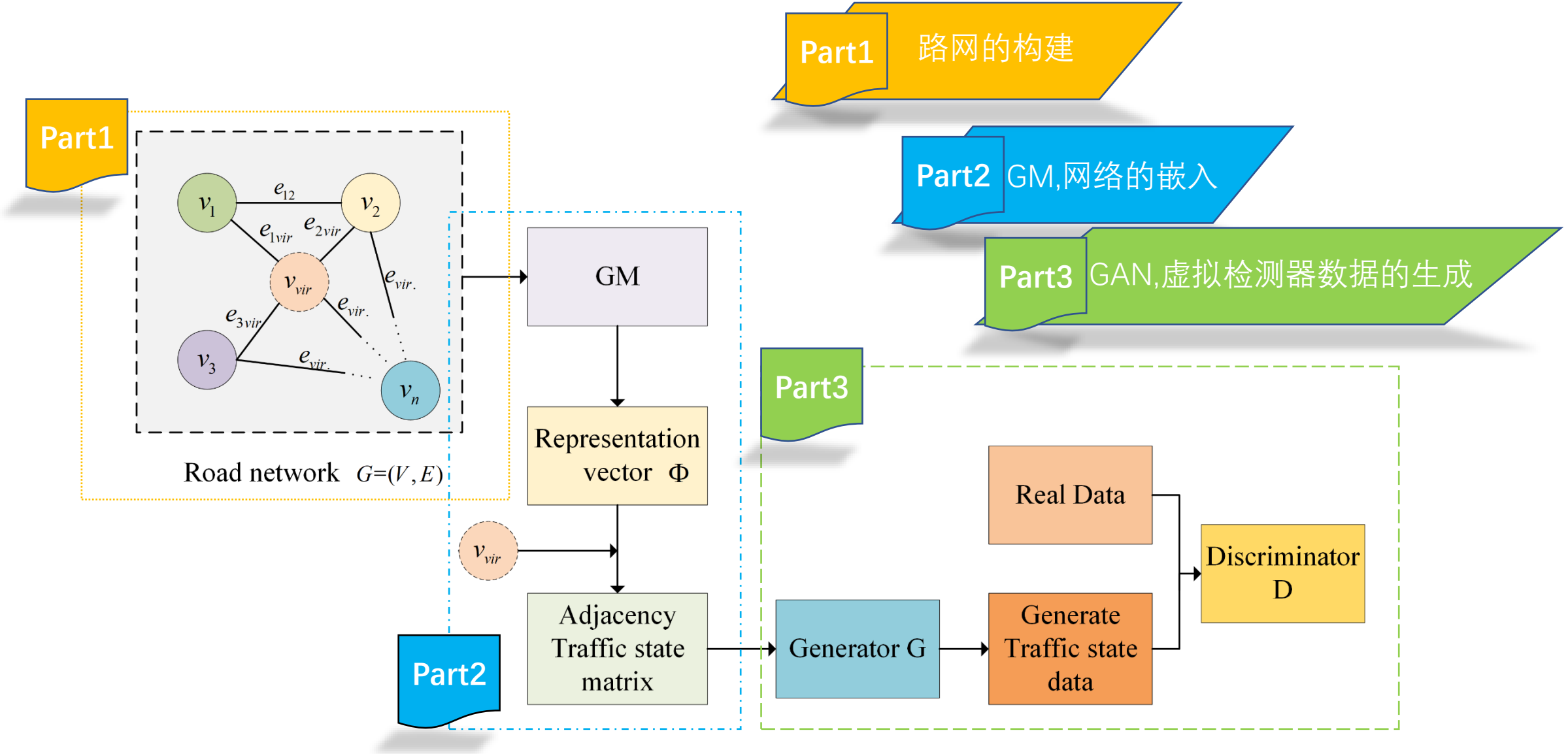
GE-GAN

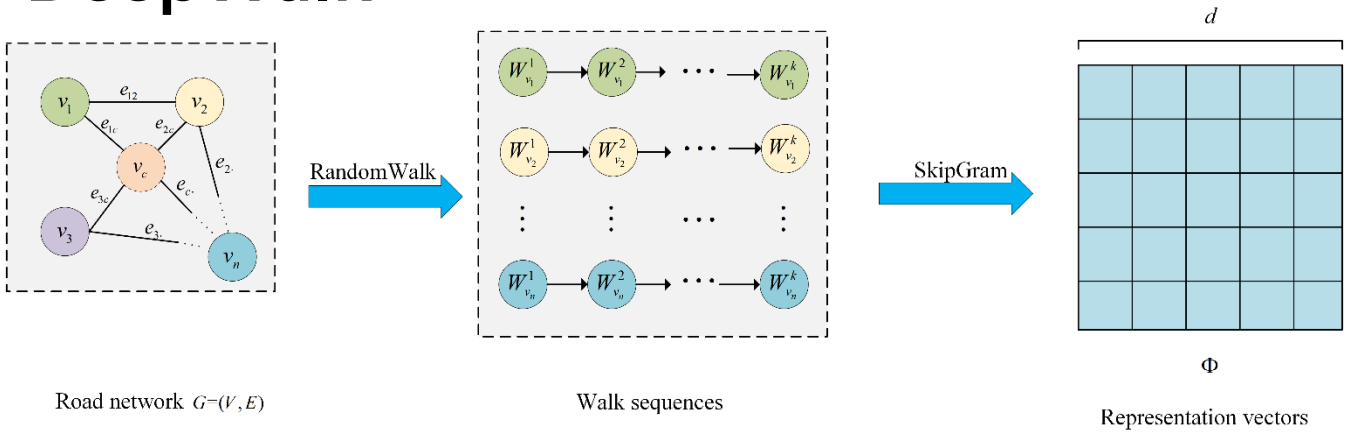
Part1 路网的构建

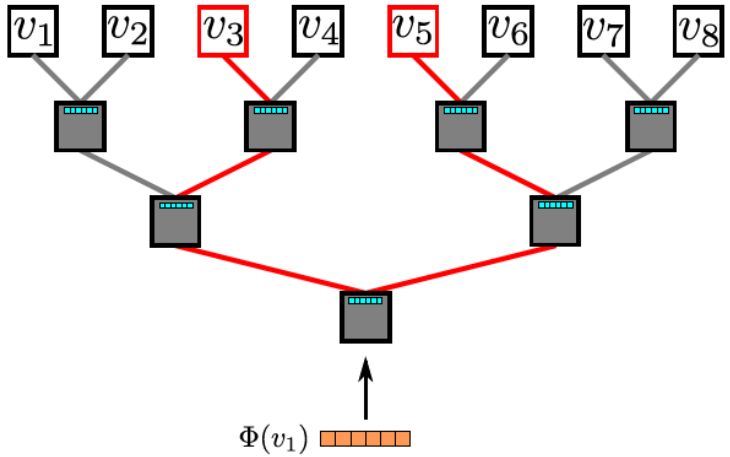
Part2 GM,网络的嵌入

Part3 GAN,虚拟检测器数据的生成



DeepWalk





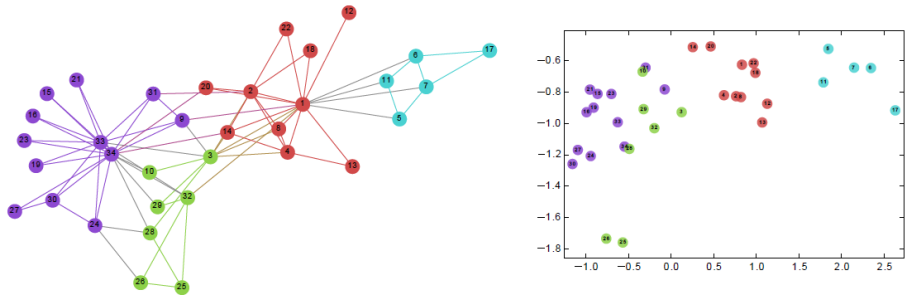
Hierarchical softmax：

$$\underset{\Phi}{minimize} \quad -\log \Pr\left(\{v_{i-w},\ldots,v_{i-1},v_{i+1},\ldots,v_{i+w}\}|\Phi(v_i)\right)$$

$$\Pr\left(\{v_{i-w},\ldots,v_{i-1},v_{i+1},\ldots,v_{i+w}\}|\Phi(v_i)\right) = \prod_{j=i-w,j\neq i}^{i+w} \Pr(v_j|\Phi(v_i))$$

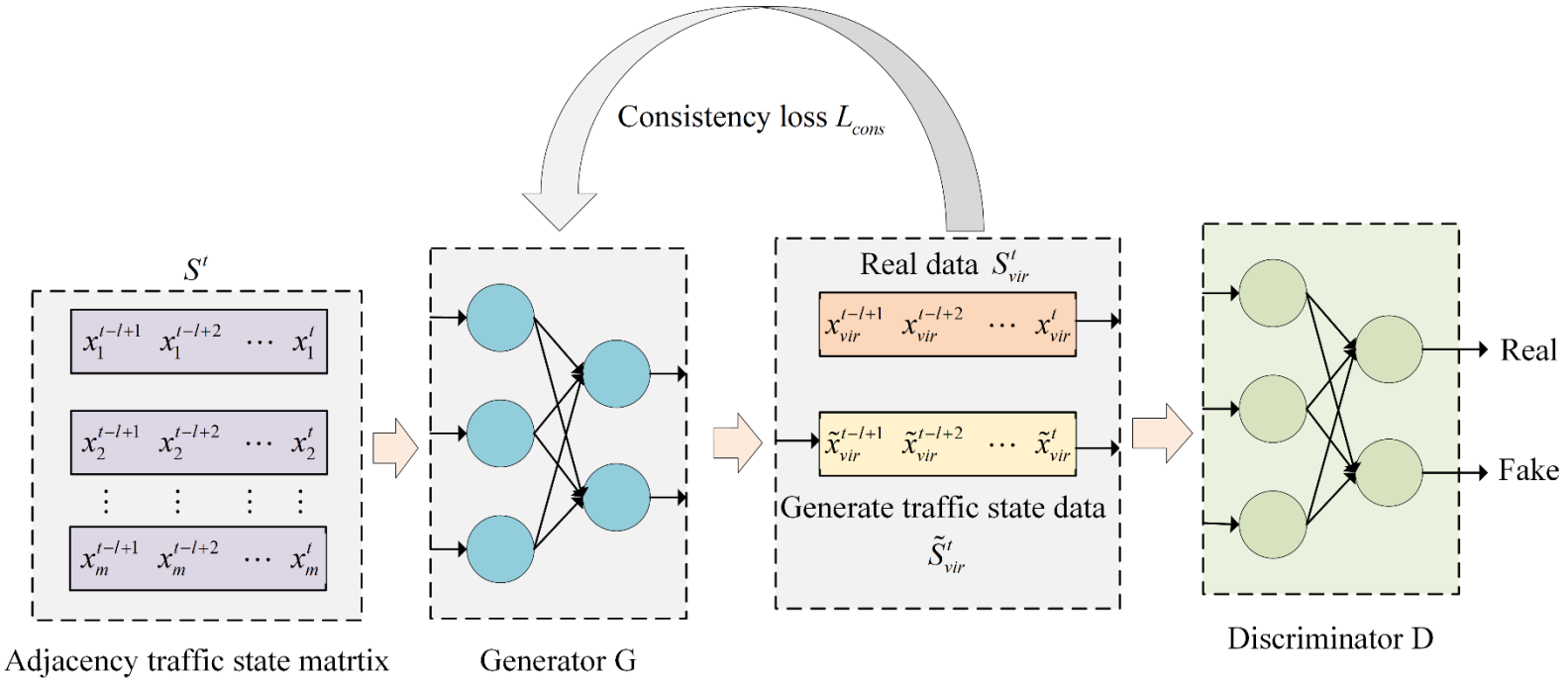
$$\Pr(v_j|\Phi(v_i)) = \prod_{r=1}^{\log|V|} \Pr(b_r|\Phi(v_i))$$

$$\Pr(b_r|\Phi(v_i)) = \frac{1}{1+e^{-\Phi(v_i)\cdot\phi(b_r)}}$$



(a) Input: Karate Graph (b) Output: Representation

GAN



$$L_G = -D(G(S^t)) + \alpha \cdot L_{cons}$$

$$L_D = D(G(S^t)) - D(S^t_{vir})$$

$$L_{cons} = MSE(G(S^t), S^t_{vir}) = \frac{1}{l} \sum_{a=t-l-1}^{t} (x^a_{vir} - \tilde{x}^a_{vir})^2$$

生成单个检测器数据结果

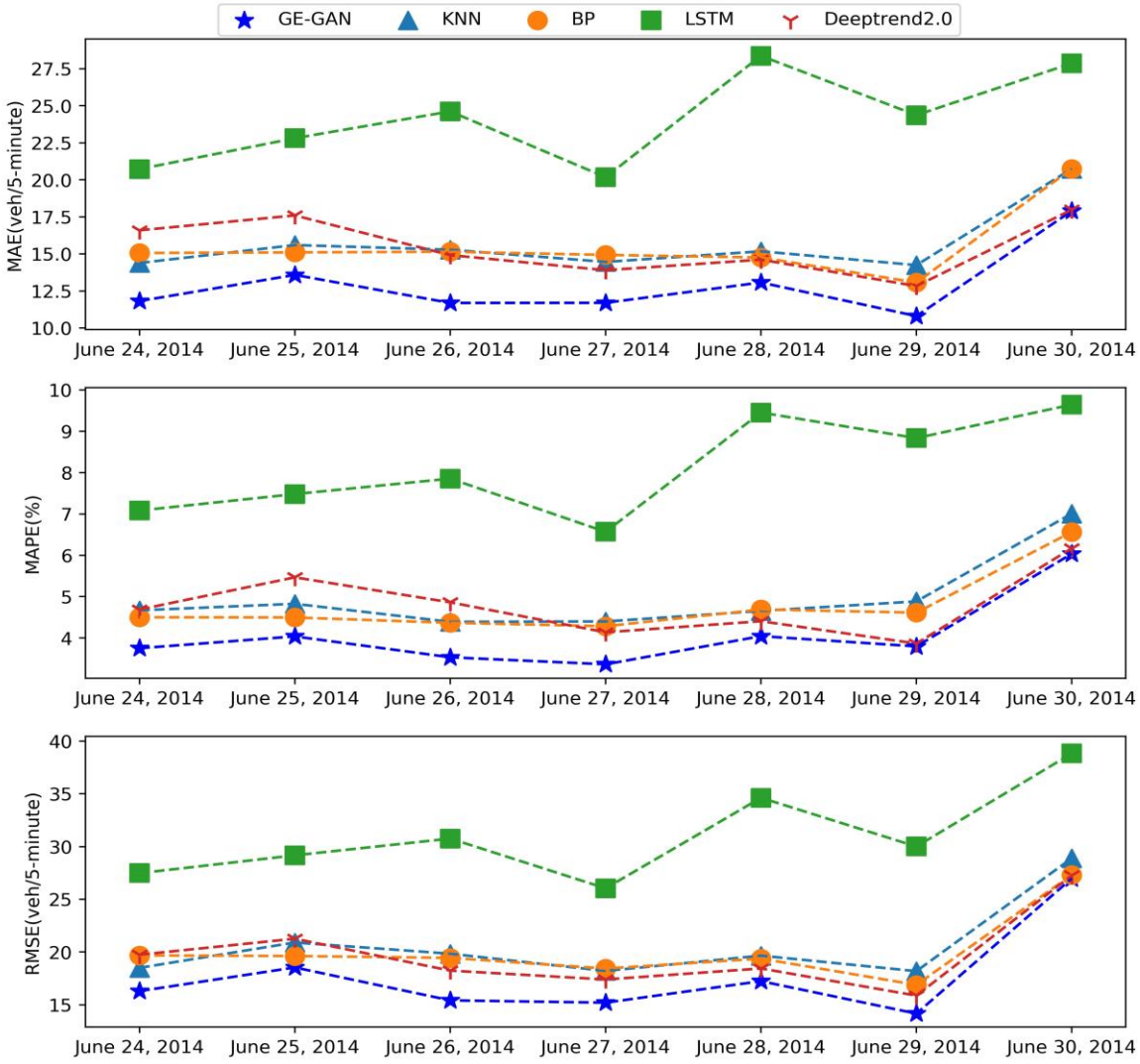
VDS	Workdays			Weekends		
	RMSE	MAE	MAPE(%)	RMSE	MAE	MAPE(%)
716449	10.46	7.56	5.16	9.39	7.50	5.32
716476	13.20	9.05	4.54	11.66	8.32	4.47
760226	12.82	9.16	**3.12**	11.50	8.44	**3.28**
716442	13.58	9.72	3.72	13.42	9.98	4.54
760167	17.02	10.50	5.21	14.30	9.97	4.96
760196	16.47	10.57	4.26	15.39	9.81	4.99
760236	14.99	11.12	3.49	15.18	11.41	3.98
760187	17.02	11.92	4.25	14.51	10.66	4.40
760101	22.96	13.88	4.20	15.38	11.70	3.65

同时生成多个检测器数据结果

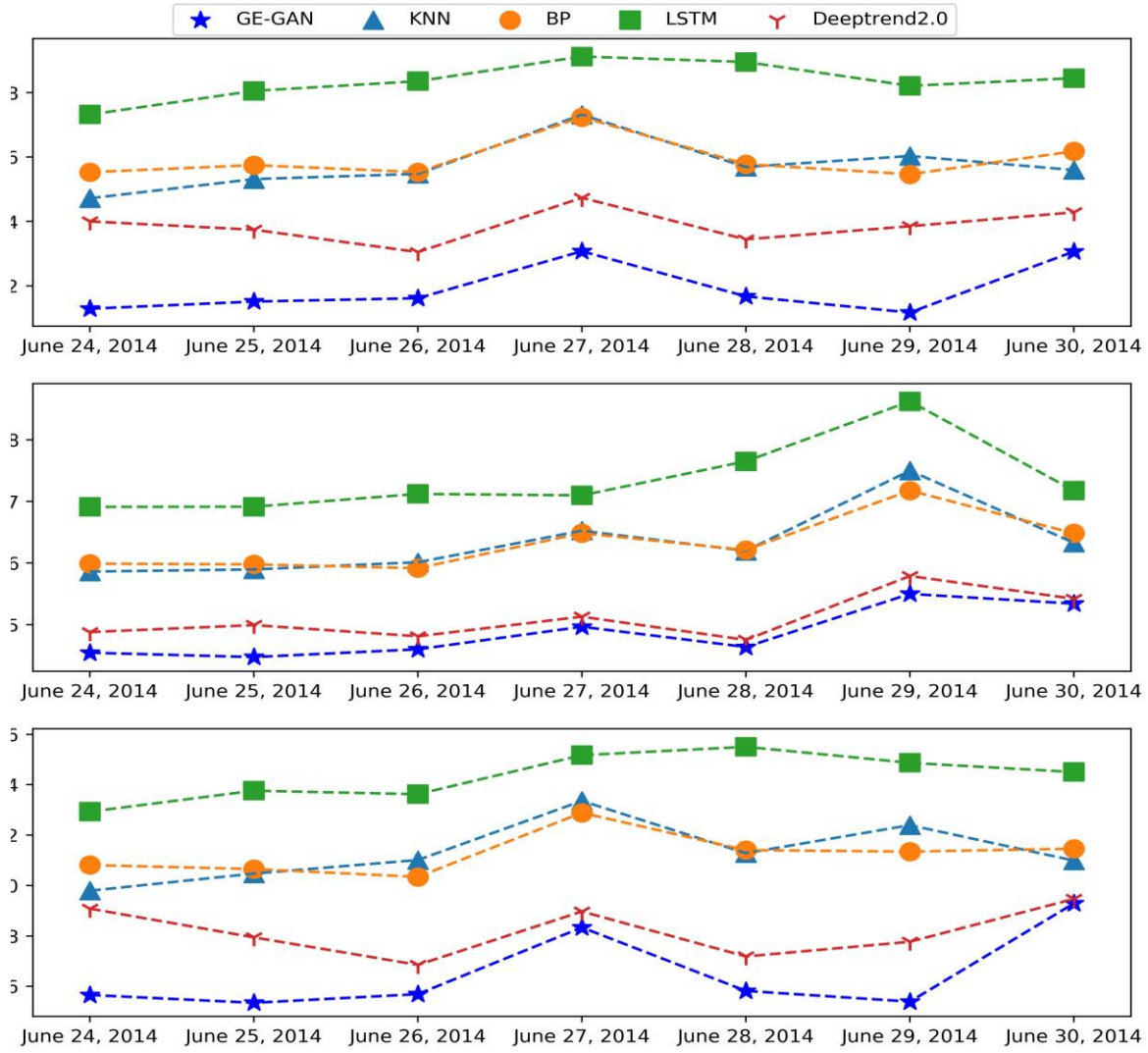
Relation of VDSs	Objective numbers of VDSs	Workdays			Weekends		
		RMSE	MAE	MAPE(%)	RMSE	MAE	MAPE(%)
Adjacent	6,7	23.91	15.03	4.33	18.32	13.96	4.18
	11,12	16.43	11.49	5.63	15.71	11.35	5.80
	16,17	19.58	13.92	5.16	17.84	12.11	5.74
	20,21	14.47	10.73	3.55	18.75	12.27	4.92
	21,22	17.92	13.19	6.04	29.89	18.6	10.22
Average error		**18.46**	**12.87**	**4.94**	**20.10**	**13.66**	**6.17**
Not adjacent	7,11	16.80	12.12	4.48	15.59	11.51	4.69
	19,22	12.18	8.83	4.53	11.59	8.75	4.81
	16,20	14.93	10.35	3.67	14.08	10.20	4.39
	6,9	21.14	15.45	4.61	17.88	13.27	4.25
	20,22	12.04	8.80	4.43	11.51	8.71	4.72
Average error		**15.42**	**11.11**	**4.34**	**14.13**	**10.49**	**4.57**

单个传感器生成精度较高；工作日生成数据精度较高（数据量大）

与其他模型结果对比图



单个检测器最后一周平均误差



多个检测器最后一周平均误差