https://zhuanlan.zhihu.com/p/273442092

1. **相关背景**

* 论文基于什么样的学科背景
* 针对什么样的现象或发现，提出了什么观点

1. **问题是什么？**

* 基于怎样的事实，发现了什么样的问题
* 该问题为什么在这个事实中很关键
* 相关研究工作是如何解决此类问题
* 作者是怎样解决的问题

**3、现有解决方案**

**4、作者的核心思想、创新点是在哪里**

**5、通过什么样的实验进行验证**

**6、对你的启发**

Q1 论文试图解决什么问题？

Q2 这是否是一个新的问题？

Q3 这篇文章要验证一个什么科学假设？

Q4有哪些相关研究？如何归类？谁是这一课题在领域内值得关注的研究员？

Q5论文中提到的解决方案之关键是什么？

Q6论文中的实验是如何设计的？

Q7用于定量评估的数据集是什么？代码有没有开源？

Q8论文中的实验及结果有没有很好地支持需要验证的科学假设？

Q9这篇论文到底有什么贡献

Q10下一步呢？有什么工作可以继续深入？

交通流：

[1] 任其亮,徐韬,程龙春.基于射频数据的道路交通流路径识别优化模型[J].交通运输系统工程与信息,2022,22(4):89-95

[1] 孙然然,张静萱,朱广宇.基于SVM的危险交通流状态实时识别模型[J].公路交通科技,2021,38(10):120-128

[1] 姚荣涵,王荣贇,张文松,叶劲松,孙锋.基于生成对抗网络的交通流参数实时估计模型[J].交通运输系统工程与信息,2022,22(3):158-167

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[1] 杨达,吕蒙,戴力源,王啸文,郭茜.车联网环境下自动驾驶车辆车道选择决策模型[J].中国公路学报,2022,35(4):243-255

traffic flow：

Yun Yuan, Zhao Zhang, Xianfeng Terry Yang, Shandian Zhe,

Macroscopic traffic flow modeling with physics regularized Gaussian process: A new insight into machine learning applications in transportation,

Transportation Research Part B: Methodological,

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(https://www.sciencedirect.com/science/article/pii/S0191261521000369)

Abstract: Despite the wide implementation of machine learning (ML) technique in traffic flow modeling recently, those data-driven approaches often fall short of accuracy in the cases with a small or noisy training dataset. To address this issue, this study presents a new modeling framework, named physics regularized machine learning (PRML), to encode classical traffic flow models (referred as physics models) into the ML architecture and to regularize the ML training process. More specifically, leveraging the Gaussian process (GP) as the base model, a stochastic physics regularized Gaussian process (PRGP) model is developed and a Bayesian inference algorithm is used to estimate the mean and kernel of the PRGP. A physics regularizer, based on macroscopic traffic flow models, is also developed to augment the estimation via a shadow GP and an enhanced latent force model is used to encode physical knowledge into the stochastic process. Based on the posterior regularization inference framework, an efficient stochastic optimization algorithm is then developed to maximize the evidence lowerbound of the system likelihood. For model evaluations, this paper conducts empirical studies on a real-world dataset which is collected from a stretch of I-15 freeway, Utah. Results show the new PRGP model can outperform the previous compatible methods, such as calibrated traffic flow models and pure machine learning methods, in estimation precision and is more robust to the noisy training dataset.

Keywords: Macroscopic traffic flow model; Physics regularized machine learning; Multivariate Gaussian process; Posterior regularization inference

Rafael Delpiano, Juan Carlos Herrera, Jorge Laval, Juan Enrique Coeymans,

A two-dimensional car-following model for two-dimensional traffic flow problems,

Transportation Research Part C: Emerging Technologies,

Volume 114,

2020,

Pages 504-516,

ISSN 0968-090X,

https://doi.org/10.1016/j.trc.2020.02.025.

(https://www.sciencedirect.com/science/article/pii/S0968090X18317996)

Abstract: This paper proposes a two-dimensional car-following model to tackle traffic flow problems where considering continuum lateral distances enables a simpler or more natural mathematical formulation compared to traditional car-following models. These problems include (i) the effects of lateral friction often observed in HOV lanes and diverge bottlenecks, (ii) the relaxation phenomenon at merge bottlenecks, (iii) the occurrence of accidents due to lane changing, and (iv) traffic models for autonomous vehicles (AVs). We conjecture that traditional car-following models, where the lateral dimension is discretized into lanes, struggle with these problems and one has to resort to ad-hoc rules conceived to directly achieve the desired effect, and that are difficult to validate. We argue that the distance maintained by drivers in order to avoid collisions in all directions plays a fundamental role in all these problems. To test this hypothesis, we propose a simple two-dimensional microscopic car-following model based on the social force paradigm, and build simulation experiments that reproduce these phenomena. These phenomena are reproduced as an indirect consequence of the model’s formulation, as opposed to ad-hoc rules, thus shedding light on their causes. A better understanding of the behavior of human drivers in the lateral dimension can be translated to improving autonomous driving algorithms so that they are human-friendly. In addition, since AV technology is proprietary, we argue that the proposed model should provide a good starting point for building AV traffic flow models when real data becomes available, as these data come from sensors that cover two-dimensional regions.

Keywords: Traffic flow theory; Microscopic traffic models; Car following; Social forces; Two-dimensional traffic; Relaxation phenomenon

Yangsheng Jiang, Sichen Wang, Zhihong Yao, Bin Zhao, Yi Wang,

A cellular automata model for mixed traffic flow considering the driving behavior of connected automated vehicle platoons,

Physica A: Statistical Mechanics and its Applications,

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126262,

ISSN 0378-4371,

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(https://www.sciencedirect.com/science/article/pii/S0378437121005355)

Abstract: With the development of automated driving technology and communication technology, the emergence of connected automated vehicles (CAVs) will significantly improve traffic efficiency and safety. To study the influence of connected automated vehicles (CAVs) on mixed traffic flow, this study proposes a cellular automata (CA) model of mixed traffic flow considering the driving behavior of the platoon of CAVs. Firstly, three car-following modes, Human-driven vehicle (HDV), Adaptive Cruise Control (ACC), and Cooperative Adaptive Cruise Control (CACC), in mixed traffic flow are analyzed. Secondly, on the bias of the safety distance model and platoon behavior analysis, the acceleration, deceleration, and randomization rules of the cellular automata model of mixed traffic flow are developed. The time step is introduced into the model in the rule design, and the reaction time of the vehicle is considered in the randomization rule. Finally, a numerical simulation is conducted to analyze the fundamental diagram of mixed traffic flow, traffic congestion, and speed volatility under different penetration rates of CAVs. The result shows that (1) the road capacity under the pure CAV environment has increased by 3.24 times compared with the pure HDVs; (2) the maximum congestion reduction percentage can reach 63.36%; and (3) when the penetration rate reaches 80%, the velocity fluctuation decreases significantly. Sensitivity analysis shows that when the penetration rate of CAVs is 100%, the maximum platoon size increase can improve the road capacity. Furthermore, the maximum platoon size has an optimal value in a specific density range.

Keywords: Mixed traffic flow; Cellular automata model; Connected automated vehicles; Platoon; Maximum platoon size