

Master's Thesis Supervisor's Expert Opinion

Student: Douglas Godfred Enim
 Student Number: E23968
 Title of Master's Thesis: Temporal fusion transformers for traffic flow prediction in smart cities
 Aim of the Thesis: To introduce temporal fusion transformers, characterize approaches to traffic flow prediction in smart cities, propose a traffic flow prediction system using temporal fusion transformers, pre-process traffic flow datasets, validate the proposed prediction system using the datasets, and discuss implications for smart cities.
 Thesis Supervisor: prof. Ing. Petr Hájek, Ph.D.
 Study Programme: Informatics and System Engineering
 Academic Year: 2024/2025

Difficulty of the Topic

	Excellent	Very good	Satisfactory	Unsatisfactory	Cannot be evaluated
Theoretical knowledge	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Input data and their processing	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Methods used	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thesis Evaluation Criteria

	Excellent	Very good	Satisfactory	Unsatisfactory	Cannot be evaluated
Degree of achievement of the aim of the thesis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Original attitude to the topic processing	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adequacy of the methods used	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Depth of analysis (relative to topic)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Logical structure of the thesis and scope	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Working with Czech and foreign literature including citations	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Formal arrangement of the thesis (text, charts, tables)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Language level (style, grammar, terminology)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Applicability of the Results of the Thesis

	High	Medium	Low	Cannot be evaluated
For theory	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
For practice	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other Comments on the Thesis

The thesis presents a well-structured and comprehensive exploration of using TFT models to multi-site, short-term traffic forecasting. The author demonstrates a solid theoretical foundation, introducing smart-city traffic management challenges and reviewing both classical and deep learning approaches. The methodology is explained in sufficient detail, with attention given to data pre-processing, hyper-parameter tuning, and model interpretability. The experiments are clearly documented, and the TFT model shows a substantial performance improvement over the persistence baseline. However, while the thesis convincingly shows the superiority of the proposed approach, it lacks a comparative analysis with other state-of-the-art deep learning models beyond the simple persistence baseline. Such a benchmark would better contextualize the reported gains. Additionally, the discussion of results could benefit from deeper insights. For example, explaining why the model performs better at certain sites or time horizons, and linking variable importance findings more explicitly to traffic management implications. Overall, the work is technically sound, methodologically thorough, and well-written, but its contribution could be strengthened by situating the results within a broader performance comparison and providing richer interpretations of the empirical findings.

Comments on the Outputs from the Theses System

Highest degree of compliance: 3%, similarity assessment: the thesis is not plagiarized

Questions and Suggestions for Defence

1. How would you address the challenges of deploying the proposed TFT-based traffic prediction system in a real-time smart city environment (e.g., regarding data latency and system scalability)?

Final Evaluation

I **recommend** the thesis for the defence.
I propose to grade this Master's thesis as follows: **C**

In Pardubice 8.8.2025

Signaturef.....