博士学位論文 審査結果の要旨

Abstract of review result

芝浦工業大学大学院 理工学研究科 博士（後期）課程

Doctoral thesis defense committee

博士学位論文審査委員会

Main examiner 主査	HENRY Michael
Examiner 審査委員	IWAKURA Seiji
Examiner 審査委員	HIRABAYASHI Yukiko
Examiner 審査委員	LE Yiping
Examiner 審査委員	HAMAOKA Hidekatsu
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氏　　名 Applicant's Name	Nitesh ACHARYA
論文題目 Thesis title	Exploring analytical approaches to data-driven safety management for mountainous highways

〔論文審査の要旨〕

Abstract of review

The final defense was held on Tuesday, July 9, with four committee members present in person and one online. Approximately ten SIT students and staff also joined on-site.

The final defense began with a 60-minute presentation by the candidate on the outcomes of his doctoral study. He first reviewed the global importance of road safety and the need for data-driven management of roads, then introduced a set of more than 40 road characteristics – decided by an in-depth literature review – and the 160-kilometer highway in Nepal for which those characteristics were evaluated by field survey. The candidate then presented the results of three different approaches to the analysis of road safety: treatment of road crashes as a binary variable (crash occurrence), treatment as a continuous variable (number of road crashes), and treatment of road crash severity as an ordinal variable. For each approach, he utilized a variety of statistical and machine learning techniques to explore which road characteristics affected crash occurrence, crash frequency, and crash severity, while also identifying the modeling techniques that yielded the best prediction accuracy. Data from a different, 60-kilometer highway in Nepal were also used to verify the generalizability of the prediction models. Based on feedback from the preliminary defense, the candidate then introduced an analytical method for determining the effectiveness of road safety countermeasures using an ensemble approach, upon which he developed a budget optimization algorithm that could be used to identify which road safety countermeasures should be implemented for which road segments to realize the greatest reduction in road crashes.

In the Q&A, the examiners focused on the length of road segments, the small number of crashes, and the low prediction accuracy of the developed models. While they acknowledged that the research was limited by the available data, they also noted that this leads to a high degree of uncertainty in both the road crash prediction and budget optimization, and they strongly recommended that the candidate revise the thesis to include consideration of these uncertainties.

In consideration of the research outcomes achieved in this study in the context of the practical limitations that were faced, the examiners unanimously agreed that the candidate passed the final examination of his doctoral thesis.