Born and raised on the Roof of the World, the Tibetan Plateau, the spirit of adventure runs in my blood. Besides expeditions to the high peaks of the Himalayas, intellectual explorations have also been an indispensable part of my life. Science's unsolved questions have long fascinated me, far more than the close-ended questions I encountered in my coursework.

In previous research endeavors, I have explored latency reduction in information-centric networking, data collection using vehicular ad-hoc networks, and the use of Graph Neural Networks (GNNs) in traffic accident prediction. My research participation has enhanced my skills in data mining, computational modeling, and deep learning. From finding research topics to publishing papers, I have demonstrated a profound affinity for academic research.

My first experience with scientific research was as an undergraduate research assistant. I studied the mechanism of information-centric networking and devised two algorithms to improve the routing and placement of data packets. This work could improve network performance in terms of delay, cache hits, and network traffic. The second project I worked on involved simulating the process of data collection using taxis. Based on an analysis of the real-world trajectory of cabs, my supervisor and I then proposed three schemes to improve the deployment of data centers to increase the efficiency of data collection. This research proved the feasibility of utilizing taxis to collect useful data that, if applied in practice, has the potential to facilitate the maintenance of infrastructure.

Upon completion of my bachelor's degree, I studied abroad at the National University of Singapore. In my master's degree thesis, I built four graph-based traffic accident datasets using real-world geospatial data. My supervisor and I also proposed a novel GNN framework to capture angular and directional information from road networks. I then comprehensively evaluated ten state-of-the-art machine learning approaches using the created datasets. We demonstrated that the proposed framework consistently outperforms the baselines. Following that, I built and released a new set of traffic accident benchmark datasets for one thousand US cities, added four GNN baselines, and tested fourteen models on all of the released datasets. This work was presented as a contributed talk at The Workshop on Graph Learning Benchmarks.

During my GNN project, I realized that models cannot be fully trusted without reasoning the underlying mechanisms behind the predictions. For applications like traffic accident prediction, we need human-intelligible explanations to inform the design of future road networks. Therefore, it is my hope to work on explainability in GNNs. What is of particular attraction to me is Dr. Aleksandar Bojchevski's expertise in trustworthy machine learning. Working with Dr. Bojchevski could provide me with valuable inspiration for improving the trustworthiness of GNNs.

Being a first-generation college student, I am highly grateful for all the teachers and mentors who have helped me along the way. My rural background has not stymied but instead only deepened my aspiration for knowledge. Deciding to pursue a Ph.D. is a bold choice, yet bold decisions are what have brought me this far. Hence, I strongly aspire to join your research group so that I can embark upon one of the most challenging paths.

Baixiang Huang

Google Scholar GitHub
huang.baixiang@u.nus.edu
baixianghuang.github.io/huangbx-site

EDUCATION

National University of Singapore — Singapore
Master of Computing — Aug 2020 – Feb 2022

Central South University — China
B. Eng., Computer Science and Technology — Sep 2015 – Jun 2019

PUBLICATIONS

- **Baixiang Huang**, Bryan Hooi. Traffic Accident Prediction using Graph Neural Networks: New Datasets and the TRAVEL Model, *The ACM Web Conference Workshop on Graph Learning Benchmarks*, 2022. Contributed talk. [PDF] [Data]

- **Baixiang Huang**, Wei Liu, Tian Wang, et al. Deployment Optimization of Data Centers in Vehicular Networks. *IEEE Access*, 2019. [PDF]

- **Baixiang Huang**, Anfeng Liu, Chengyuan Zhang, et al. Caching Joint Shortcut Routing to Improve Quality of Service for Information-Centric Networking. *Sensors*, 2018. [PDF]

RESEARCH EXPERIENCE

National University of Singapore, supervisor: Professor Bryan Hooi — Jan 2021 – Apr 2022

- Built and released one thousand graph-based traffic accident benchmark datasets for accident prediction problems.
- Proposed a novel graph neural network architecture to capture angular and directional information from road networks.
- Evaluated the proposed framework against state-of-the-art machine learning approaches.
- Achieved the best overall performance on the released datasets.

Central South University, supervisor: Professor Anfeng Liu — Mar 2018 – Apr 2019

- Simulated the process of collecting the condition data of infrastructure using taxis.
- Proposed three schemes to improve the efficiency of data collection.
- Analyzed and tested the proposed schemes on real-world trajectory data of taxis.
- Proved the feasibility of using cabs to collect the condition data of infrastructure.

Central South University, supervisor: Professor Anfeng Liu — Feb 2017 – Mar 2018

- Simulated a scenario of information-centric networking.
- Developed two algorithms to improve the routing and replacement of data packets.
- Achieved improvements in terms of delay, cache hits, and network traffic.

PROJECT EXPERIENCE

Online Course Platform [Code]

- Built an online course website with Spring Cloud.
- Applied Apache FreeMarker to accelerate development by generating code for similar services.
- Implemented ApsaraVideo VOD APIs to encrypt and authorize course videos.
- Designed and developed web pages using Vue and Bootstrap.

SKILLS

- Programming Languages: Java, Python, HTML/CSS
- Frameworks: PyTorch, PyG, MyBatis, Spring Boot, Vue
- Miscellaneous: Linux, MySQL, Hadoop, Git, Maven

NATIONAL UNIVERSITY of SINGAPORE

OFFICIAL TRANSCRIPT

NAME: HUANG BAIXIANG STUDENT NO.: A0224890B DATE OF BIRTH: 30/08/1996 DATE ISSUED: 28/02/2022

DEGREE CONFERRED: MASTER OF COMPUTING
CUMULATIVE AVERAGE POINT: 3.67
CUMULATIVE MODULAR CREDITS: 40.00
ADMISSION DATE: 03/08/2020
CONFERMENT DATE: 28/02/2022
SPECIALISATION: COMPUTER SCIENCE

MODULE		GRADE	CREDITS
ACADEMIC YEAR 2020/2021 SEMESTER 1			
CS5228	KNOWLEDGE DISCOVERY AND DATA MINING	B	4.00
CS5229	ADVANCED COMPUTER NETWORKS	B	4.00
CS5240	THEORETICAL FOUNDATIONS IN MULTIMEDIA	B-	4.00
MASTER OF COMPUTING CUMULATIVE AVERAGE POINT: 3.33			
ACADEMIC YEAR 2020/2021 SEMESTER 2			
CP5101	MCOMP DISSERTATION	IP	16.00
CS5346	INFORMATION VISUALISATION	A-	4.00
MASTER OF COMPUTING CUMULATIVE AVERAGE POINT: 3.63			
ACADEMIC YEAR 2021/2022 SEMESTER 1			
CP5101	MCOMP DISSERTATION	IP	16.00
CS5239	COMPUTER SYSTEM PERFORMANCE ANALYSIS	B-	4.00
CS5242	NEURAL NETWORKS AND DEEP LEARNING	A-	4.00
MASTER OF COMPUTING CUMULATIVE AVERAGE POINT: 3.67			
ACADEMIC YEAR 2021/2022 SEMESTER 2			
CP5101	MCOMP DISSERTATION	CS	16.00

MASTER OF COMPUTING
CUMULATIVE AVERAGE POINT: 3.67

****************************END OF TRANSCRIPT****************************

Registrar

PRINTED BY: REGMB
PAGE 1 OF 1

中南大學
CENTRAL SOUTH UNIVERSITY

加权平均成绩证明
Grade Point Average Certificate

姓名：黄柏翔 Name: Baixiang Huang	学号：1502150321 Student ID: 1502150321
学院：计算机学院 College: School of Computer Science and Engineering	专业：计算机科学与技术 Major: Computer Science and Technology
学制：4 年 Years of Study: 4	入学日期：2015 年 9 月 Enroll Date: September, 2015
总学分：197.5 Overall Credit: 197.5	总加权平均成绩：84.71/100 Overall Grade Point Average: 84.71/100
2015-2016 学年 Academic Year 2015-2016	
加权平均成绩 Grade Point Average	78.94/100
2016-2017 学年 Academic Year 2016-2017	
加权平均成绩 Grade Point Average	84.31/100
2017-2018 学年 Academic Year 2017-2018	
加权平均成绩 Grade Point Average	88.71/100
2018-2019 学年 Academic Year 2018-2019	
加权平均成绩 Grade Point Average	89.11/100

打印日期：2019 年 6 月 25 日
Print Date: June 25, 2019

地址：中国湖南省长沙市麓山南路 932 号中南大学
Address: Central South University, 932 South Lushan Road, Changsha, Hunan, P. R. China, 410083

中南大學本科生成绩单
Undergraduate Academic Transcript Of Central South University

Student ID: 1502150321 Name: HuangBaiXiang Gender: male Enroll Date: September, 2015
College: School of computer Science and Engineering Major: Computer Science and Technology Years of Study: 4

Course	Category	Credit	Score
Academic Year 2015-2016 1 Term			
Fundamental of Computer	RC	2.5	80
Computer Practice	RC	1	B
University Psychology	PE	2	80
Advanced Mathematics A (I)	RC	5	76
Fundamental of Computers and Programming Language	RC	2.5	80
Military Theory Course	RC	1	82
Military Training	RC	1.5	B
Moral Education and Foundation of law	RC	3	77
Physical Education (I)	RC	1	88
Introductory Course For Freshmen	RC	1	A
English Reading、Writing and Translating (I)	RC	2	83
English Viewing,Listening and Speaking (I)	RC	2	89
Academic Year 2015-2016 2 Term			
Mental Health Education	RC	2	82
University Physics C	RC	4.5	72
Circuit and Analog Electronic Technology	RC	4	79
Advanced Mathematics A (II)	RC	5	67
Advanced Programming Practice (C++)	RC	2	B
Arts Skills of Management Communication	PE	2	94
Object-Oriented Programming (C++)	RC	3	84
Physical Education (II)	RC	1	89
Linear Algebra A	RC	2	72
Writing	PE	2	88
English Reading、Writing and Translating (II)	RC	2	81
English Viewing,Listening and Speaking (II)	RC	2	92
Academic Year 2016-2017 1 Term			
Java Language and System Design	EC	3	82
Health Education	PE	2	98
Electrical and Electronic Experiment	RC	1	B
Probability and Statistics A	RC	3.5	68
Elective Series of Advanced English	EC	2	96
Discrete Mathematics	RC	3	70
Cognition Practice	RC	2	B
Data Structure	RC	3.5	65
Digital Electronic Technology A	RC	3.5	87
Physical Education (III)	RC	1	84
English Viewing,Listening and Speaking (III)	RC	2	96
Professional Introduction	RC	1	B
Academic Year 2016-2017 2 Term			
Principle of Operating System	EC	3	84
Course Design of Electronic Technology	RC	2	B
Computer Network	RC	3	87
Computer Principle and Assembly Language	RC	4	91
Course Design of Computer Principle and Assembly	RC	2	A
Artificial Intelligence	EC	2	90
Database Principle	RC	3	78
Algorithm Analysis and Design	EC	3	91
Physical Education (IV)	RC	1	92
Situation and Policy	RC	1	96
Academic Year 2017-2018 1 Term			
Course Design of Java	RC	2	A
RFID and Smart Card Techniques	EC	3	96
Large Database Technology	EC	3	90
Molecular Biology	RC	2	87
Computer Network Course Design	RC	2	B
Software Architecture	EC	2	92
Data Structure Course Design	RC	2	A
Digital Image Processing	EC	2	82
Physical-Fitness Test (I)	RC	0.5	74
Network Engineering	EC	2	80
Academic Year 2017-2018 2 Term			
System & Application of Linux	EC	2	95
Introduction to Parallel Computing	EC	2	92
Operating System Course Design	RC	2	B
Introduction to Innovation and Entrepreneurship	EC	2	96
Multimedia Principle and System Design	EC	2	87
Distributed Systems	EC	2	98
Software Testing	EC	2	90
Software Engineering	EC	3	75
Integrated Course Design of Database	RC	2	B
Physical-Fitness Test (II)	RC	0.5	83
Modern Chinese History	RC	2	88
Academic Year 2018-2019 1 Term			
Electronic-Commerce and Electronic-Government	EC	2	89
Computer Simulation and Modeling	EC	1.5	81
Visualization Technology	EC	2	85
Basic Theory of Marxism	RC	3	86
Mao Zedong Thought and theoretical system of socialism with Chinese characteristics	RC	5	80
Production Practice	RC	3	B
Bioinformatics	EC	2	88
Introduction to Data Science Big Data	RC	2	88
Physical-Fitness Test (III)	RC	0.5	85
Subject I Computer Control Technology	EC	1	93
Subject II - The Development of Modern Computer Technology	EC	1	88
Subject III - Information Processing and Fusion Technology	EC	1	86
Academic Year 2018-2019 2 Term			
Graduation Practice and Project	RC	16	A
Skill Assessment	ES	3.0	P
Academic Achievements	ES	4.0	P
Social Practice	ES	1.0	P

CET-4 : 571 CET-6: 609

*************************Transcript Total*************************

Credits: Required Course : 131 Elective Course : 50.5
Public Elective Course : 8 Extracurricular studies : 8

Remarks: Resit or retaken course results are marked with "*".

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S/N: ZNDX IHGF HEKB FDDF AIMD
Web: http://print.csu.edu.cn/valid.jsp

Page 1 of 1 Date: June 25, 2019

中南大學本科生成绩单
Undergraduate Academic Transcript Of Central South University

学号：1502150321 姓名：黄柏翔 性别：男 入学年月：2015年09月
学院：计算机学院 专业：计算机科学与技术（大数据方向）班级：计算机(大数据)1501 学制：四年

课程/环节	性质	学分	成绩
2015-2016 学年 第1学期			
大学计算机基础	必修	2.5	80
大学计算机基础实践	必修	1	良
大学心理学	任选	2	80
高等数学A（一）	必修	5	76
计算机与程序设计语言基础	必修	2.5	80
军事理论课	必修	1	82
军训	必修	1.5	良
思想道德修养与法律基础	必修	3	77
体育（一）	必修	1	88
新生课	必修	1	优
英语读写译（一）	必修	2	83
英语视听说（一）	必修	2	89
2015-2016 学年 第2学期			
大学生心理健康教育	必修	2	82
大学物理C	必修	4.5	72
电路与模拟电子技术	必修	4	79
高等数学A（二）	必修	5	67
高级程序设计实践（C++）	必修	2	良
管理沟通艺术与技巧	任选	2	94
面向对象编程(C++)	必修	3	84
体育（二）	必修	1	89
线性代数A	必修	2	72
写作	任选	2	88
英语读写译（二）	必修	2	81
英语视听说（二）	必修	2	92
2016-2017 学年 第1学期			
Java 语言与系统设计	选修	3	82
大学生健康教育	任选	2	98
电工电子实验	必修	1	良
概率论与数理统计A	必修	3.5	68
高级英语系列选修	选修	2	96
离散数学	必修	3	70
认识实习	必修	2	良
数据结构	必修	3.5	65
数字电子技术A	必修	3.5	87
体育（三）	必修	1	84
英语视听说（三）	必修	2	96
专业导论	必修	1	良
2016-2017 学年 第2学期			
操作系统原理	选修	3	84
电子技术课程设计	必修	2	良
计算机网络	必修	3	87
计算机原理与汇编	必修	4	91
计算机原理与汇编课程设计	必修	2	优
人工智能	选修	2	90
数据库原理	必修	3	78
算法分析与设计	选修	3	91
体育（四）	必修	1	92
形势与政策	必修	1	96
2017-2018 学年 第1学期			
Java课程设计	必修	2	优
RFID与智能卡技术	选修	3	96
大型数据库技术	选修	3	90
分子生物学	必修	2	87
计算机网络课程设计	必修	2	良
软件体系结构	选修	2	92
数据结构课程设计	必修	2	优
数字图像处理	选修	2	82
体育课外测试（一）	必修	0.5	74
网络工程	选修	2	80
2017-2018 学年 第2学期			
Linux系统及应用	选修	2	95
并行计算导论	选修	2	92
操作系统课程设计	必修	2	良
创新创业导论	选修	2	96
多媒体原理与系统设计	选修	2	87
分布式系统	选修	2	98
软件测试	选修	2	90
软件工程	选修	3	75
数据库综合课程设计	必修	2	良
体育课外测试（二）	必修	0.5	83
中国近现代史纲要	必修	2	88
2018-2019 学年 第1学期			
电子商务与电子政务	选修	2	89
计算机仿真与建模	选修	1.5	81
可视化技术	选修	2	85
马克思主义基本原理	必修	3	86
毛泽东思想和中国特色社会主义理论体系概论	必修	5	80
生产实习	必修	3	良
生物信息学	选修	2	88
数据科学与大数据技术导论	必修	2	88
体育课外测试（三）	必修	0.5	85
专题Ⅰ计算机控制技术	选修	1	93
专题Ⅱ-现代计算机技术发展	选修	1	88
专题Ⅲ-信息处理与融合技术	选修	1	86
2018-2019 学年 第2学期			
毕业实习与设计	必修	16	优
技能考试	课外	3.0	通过
论文成果	课外	4.0	通过
社会实践	课外	1.0	通过

英语四级：571 英语六级：609

*************************成绩单总计*************************

获得学分：必修：131 选修：50.5
任选：8 课外：8

备注：重修或补考成绩标识"*"号

*************************以下空白*************************

验证码:ZNDX ANKM NLCI IILK NLCD
验证网址: http://print.csu.edu.cn/valid.jsp 第 1 页 共 1 页 打印日期：2019年06月25日

中南大学本科生成绩记载说明：
百分制、五级评分制与绩点的换算标准：

百分制	100-90	89-80	79-70	69-60	≤59
五级制	优	良	中	及格	不及格
绩点	4	3	2	1	0

Description of Transcript for student of Central South University:
The one-hundred-point score can be converted into grade and GPA as follows:

Score	100-90	89-80	79-70	69-60	≤59
Grade	Excellent (A)	Good (B)	Average (C)	Pass (D)	Fail (F)
GPA	4	3	2	1	0

Abstract of Baixiang Huang's Master's Thesis

Traffic accident prediction is crucial for reducing and mitigating road traffic accidents. Existing machine learning approaches aim to predict the number of traffic accidents in each cell of a discretized grid, based on features from each grid cell, without considering the underlying graph structure of road networks. To allow us to incorporate road network information, graph-based approaches such as Graph Neural Networks (GNNs) are a natural choice, but are made challenging by a lack of suitable graph-based traffic accident prediction datasets. To overcome this problem, we first construct a new set of four graph-based traffic accident datasets, along with two benchmark tasks (accident occurrence prediction and accident severity prediction). We then comprehensively evaluate a variety of state-of-the-art GNN variants using the created datasets. Furthermore, we propose our novel Traffic Accident Vulnerability Estimation via Linkage (TRAVEL) model, which is designed to capture angular and directional information from road networks. We demonstrate that our proposed model consistently outperforms the baselines by a large margin.