Hao Wang

IDG/McGovern Institute for Brain Research, Beijing Normal University, Beijing 100875, China
Hao.Wang@mail.bnu.edu.cn | Personal Website: hannibalwanglecter.github.io/about | (+86)180-5520-0776

EDUCATION

Beijing Normal University, Beijing, China 09/2018-07/2021 (Expected)

- **M.Eng.** in Computer Science and Application, State Key Laboratory of Cognitive Neuroscience and Learning & IDG/McGovern Institute for Brain Research. Advisor: Dr. Zheng Li **GPA**: 3.6/4.0
- **Dissertation**: *Decoding Algorithms for Motor Cortical Brain Computer Interfaces Based on spikes and Phase-of-firing Encoding*

Anhui Normal University, Wuhu, China 09/2014-06/2018

- **B.Eng.** in Computer Science and Technology **GPA**: 3.5/5.0

PUBLICATIONS & COPYRIGHTS

- Zhang C., **Wang H.**, Tang S., et al. (2020) Rhesus Monkeys Learn to Control a 2D Bio-feedback Brain Machine Interface. Submitted to *Journal of Neural Engineering (Article reference: JNE-104201)*.
- **Wang H.**, Li Z., et al. (2020) Review of nonlinear decoding algorithms for motor intracortical brain-machine-interfaces. (In preparation)
- **Wang H.**, Yu Q., et al. (2017) Wuhu Intelligent Bus Information Management System (Software Copyright Sign ID: 2017SR298147).
- Zhang W., Xia Y., **Wang H.**, et al. (2018) Android-based Personal Memo (Software Copyright Sign ID: 2018SR725750).

RESEARCH / PROJECT EXPERIENCE

Decoding Algorithms of Motor Cortical Brain Computer Interfaces Based on Phase-of-firing Encoding with Rhesus Monkey 09/2018-Present

- Used CiteSpace to visualize all relevant papers of motor cortical BCI decoding algorithms in Web of Science and wrote bibliometric analysis report
- Trained the monkey to control the joystick for finishing 'center-out' behavior task
- Revised BMI3 software suite code (C++) for collecting neural data and decoding motor intention to computer screen
- Took surgeries on monkeys including implanting headpost and electrode array, took care of monkey's postoperative wound
- Summarized and optimized the preoperative preparation and operation procedure about monkey's headpost and Utah electrode implantation, documented the entire surgical procedure for future use
- Conducted Rhesus monkey electrophysiology experiments and collected neural data from implanted electrode array
- Found that Spike Triggered Average is different in different phases of Local Field Potentials (LFP) in motor cortical neural signals, selected important features such as the power value, amplitude, phase of different bands of LFP to encoding modal
- Kalman Filter (KF), Unscented KF, Stochastic State Point Process Filter, RNN, LSTM and other algorithms are used to offline decode the macaque's neural data to its motor intention. Estimate covariance of a matrix of data using shrinkage to reduce variance in the case where the number of dimensions is large versus the amount of data available
- Compared the performance of the decoders on Jupyter Notebook

Low-intensity Transcranial Ultrasound Stimulation on Rhesus Monkey 09/2019-Present

- Conducted Magnetic Resonance Imaging (MRI) scanning of a monkey for acquiring whole brain MRI image data of the monkey for preparing low-intensity transcranial ultrasound stimulation, utilized FSL-fast and BrainSight to perform segmentation of the 3D reconstruction of skull
- Configurated Transcranial Magnetic Stimulation (TMS) and Low-intensity Transcranial Ultrasound Stimulation devices and stimulated the primary motor cortex and occipital lobe of a rhesus monkey and tuned the parameters of devices according to the reaction of the monkey's behavior

Explore meaningful customer characteristics for predicting cellphone customer loss based on SVM with R language 10/2019-12/2019

- Explored descriptive statistical information of customer characteristics
- Implemented Support Vector Machine (SVM) to do data classification, chose the penalty factor of SVM and visualized the SVM model, tuned other SVM parameters

- Used R package to find highly correlated features and selected features
- Computed the confusion matrix to evaluate the predictive performance of the model using k-fold cross-validation, drew ROC curves and compared performances of different models
- Obtained resampled data and visualized statistical information of each model, including ROC, sensitivity, specificity

Handwritten digits (MNIST dataset) recognition based on deep learning 11/2019-12/2019

- Used the combination of convolutional layers and pooling layers to complete the feature extraction of digital images, based on the Google Colaboratory cloud server platform, and Keras framework, and completed feature nonlinear classification through the fully connected layer. The final image recognition prediction accuracy is 99.12%
- Designed convolutional autoencoder and denoising convolutional autoencoder. Specifically, the loss function is mean squared error and SGD optimization is used to train the network. Explored the impact of the number of training iterations on image reconstruction

LEADERSHIP / SERVICE

Vice President, Graduate Student Union, Beijing Normal University 09/2018-06/2019

- Took charge of organizing campus activities, especially the badminton competitions
- Led members to publicize the activity by designing posters, prepared the activity by confirming competition site and equipment
- Wrote a program for badminton competition registration to elevate the efficiency of tackling registration information
- Undertook the competition management and order maintenance work

Student Assistant, Administrative Office of State Key Laboratory of Cognitive Neuroscience and Learning, Beijing Normal University 09/2018-06/2019

- Took responsible for administrative affairs in the office, such as received, delivered, and printed documents, sorted out all kinds of materials, etc.
- Recovered essential missing data while the computer crashed, repaired broken computers, helped teacher to reinstall the computer system
- Participated in organizing Graduation Ceremony, including site management and order maintenance
- Helped teachers to put thousands of exam papers in order and classified thousands of test papers

SELECTED HONORS / AWARDS

- The 2st Class Scholarship, Beijing normal University 2020
- The 1st Class Scholarship, Beijing normal University 2019
- Excellent Graduate Cadres, Beijing Normal University 2019
- The Outstanding Public Welfare Contribution Award, State Key Laboratory of Cognitive Neuroscience and Learning, Beijing Normal University 2019
- Freshman Scholarship, Beijing Normal University 2018
- The Postgraduate Scholarship, SKL of Cognitive Neuroscience and Learning, Beijing Normal University 2018
- Outstanding Undergraduate's Dissertation, Anhui Normal University 2018
- Undergraduate Scholarships (totally 3 times), Anhui Normal University 2014-2017
- The 2nd Prize in the 4th ACM Program Design Competition, Wuhu city 2014

SKILLS & OTHER

- **Computer Skills**:
  - **Languages**: MATLAB, C++, Python, R, LaTeX, C#, Java
  - **AI & Machine Learning**: TensorFlow, Keras, Caffe, Pytorch, Scikit-learn, Google Colaboratory
  - **Data Analytics Skills**: data mining, database using SQL, machine learning both supervised (decision tree, random forest, SVM, and logistic regression) and unsupervised (clustering, visualization), deep learning models
  - **Miscellaneous**: Linux, Docker, Git, Inkscape
- **Neurobiological Technique**: Beijing laboratory animal practitioner certificate, Monkey training, Neurosurgical procedures, Electrophysiology experiment, MRI experiment qualification
- **Hobbies**: Boxing, Taekwondo, swimming, basketball, table tennis, badminton

Student's Academic Record of Anhui Normal University

Department:School of Computer and Information　　Major:Computer Science and Technology (Non-teacher Education)

Student No.:14111204056　　Name:Wang Hao　　ID No.:340304199604090635

Course	Credit	Score	Rebu.	Csgp.
2014-2015 Academic Year 1st Term				
Basic Program Design	3	81		3.1
Basic Experiment in Programming	1	96		4.6
Physical Education (Ⅰ)	1	97		4.7
College English (Ⅰ)	4	82		3.2
Advanced Mathematics (Ⅰ)	5	80		3
Introduction of Computer Science	2	93		4.3
Military Course	2	Qualified		2.5
Military Theory	1.0	90		4
Labor Practice Class	1	Excellent		4.5
Cultivation of Ideology & Morality and Foundation of Law	3	85		3.5
Linear Algebra	3	68		1.8
Situation and Policy (Ⅰ)	0.5	Excellent		4.5
2014-2015 Academic Year 2nd Term				
Psychological Health Education of College Students	1.0	94		4.4
Physical Education (Ⅱ)	1	90		4
College English (Ⅱ)	4	78		2.8
Electrical and Electronic Technology	3	76		2.6
Experiment on Electrical and Electronic Technology	1	98		4.8
Advanced Mathematics (Ⅱ)	5	61		1.1
Discrete Mathematics	4	93		4.3
Introduction to the Basic Principle of the Marx Doctrine	3	94		4.4
Orient-Objected Program	3	85		3.5
Object-oriented Programming Experiment	1	96		4.6
Situation and Policy (Ⅱ)	0.5	95		4.5
Career Planning and Development	1.0	95		4.5
2015-2016 Academic Year 1st Term				
Course Project for Programming	2	94		4.4
Physical Education (Ⅲ)	1	86		3.6
College English (Ⅲ)	4	86		3.6
Probability and Statistics	3	74		2.4
Data Structure	3	84		3.4
Data Structure Experiments	1	95		4.5
Digital Electronic Circuit	3	86		3.6
Situation and Policy (Ⅲ)	0.5	Excellent		4.5
Outline of Modern and Contemporary Chinese History	3	74		2.4
Explore the Theory of the World	1	98		4.8
Bibliographic Search	1.0	85		3.5
Java Advanced Program	2	91		4.1
2015-2016 Academic Year 2nd Term				
Physical Education (Ⅳ)	1	89		3.9
College English (Ⅳ)	4	94		4.4
Constitution Principle of Computer	3	76		2.6
Computer Organization Principle Experiment	1	85		3.5
Introduction to Mao Zedong Thought and Socialist Theoretical System with Chinese Characteristics	5	73		2.3
Principle of Database	3	90		4
Practice for Principle of Database	1	95		4.5
Algorithm Design and Analysis	3	78		2.8
Practice for Algorithm	1	92		4.2
Design and Analysis				
Situation and Policy (Ⅳ)	0.5	90		4
Course Project for Application System(I)	2	87		3.7
History of Chinese songs in twentieth Century	1	98		4.8
Citizen Quality Education	1	100		5
Matlab and Image Process	2	90		4
Artificial Intelligence	2	82		3.2
Practical Technology of Software Development	2.0	95		4.5
2016-2017 Academic Year 1st Term				
Compilers Principles	3	82		3.2
Operation System	3	80		3
Operating System Experiment	1	88		3.8
Introduction to Software Engineering	3	91		4.1
Computer Working Principle and Computer Interfacin	3	77		2.7
Practice for Principle of Micro computer And Interface Technology	1	94		4.4
Operations of Entrepreneurial Management	1	99		4.9
Human-Machine Interaction Technology	2	90		4
Communication Principle	2	85		3.5
2016-2017 Academic Year 2nd Term				
Computer Graphics	3	75		2.5
Computer Networks	3	86		3.6
Practice for Computer Networks	1	85		3.5
Embedded System	3	89		3.9
Numerical value Analysis	3	89		3.9
Course Project for Application System(II)	2	85		3.5

GPA　3.50

Academic Affairs Office Of AHNU　　Date:03-Jul-2020

Student's Academic Record of Anhui Normal University

Department:School of Computer and Information　　Major:Computer Science and Technology (Non-teacher Education)

Student No.:14111204056　　Name:Wang Hao　　ID No.:340304199604090635

Course	Credit	Score	Rebu.	Csgp.
Entrepreneur Guidance for College Students	1	99		4.9
Vocational Guidance for Graduates	1.0	86		3.6
Design and Development of World Wide Web	2	88		3.8
2017-2018 Academic Year 2nd Term				
Thesis Writing	8.0	Excellent		4.5
Professional Trainee and Practice	10.0	Good		3.5
Quality-oriented development	6.0	Qualified		2.5
The End				

GPA	3.50

Academic Affairs Office Of AHNU　　Date:03-Jul-2020

北京師範大學
BEIJING NORMAL UNIVERSITY

Academic Transcript of Graduate Student

Name: wanghao
School: Faculty of Psychology
Major: Computer Science and Application

Student ID: 201821061107
Advisor: Li Zheng
Degree: master

Term	Course Title	Credits	Mark	Remark
Fall 2018	Thesis writing and Academic norms	2.0	90.0	
	English toward Master's Degree（Core Courses）	3.0	79	
	Public Speaking in English	1.0	92.0	
	The Theory and Practice of Socialism with Chinese Characteristics	2.0	86.0	
	Introduction to Natural Dialectics	1.0	87.0	
	Artificial Intellegence and Deep Learning	3.0	83.0	
	Stochastic Processes	3.0	88.0	
	Research Methods in Psychology: Design and Technology	3.0	72.0	
	Cognitive Neuroscience	3.0	89.0	
	Data Mining	3.0	89.0	
	Science Visualization	3.0	98.0	
Spring 2019	Public Physical Education (Build-up & Personal Defense Skill of Wushu)	1.0	92.0	
	The Design and Analysis of Computer Algorithms	3.0	95.0	
	Machine Learning	3.0	93.0	
	Nerve Interface	2.0	100	
	Intelligent Optimization Algorithm	3.0	94.0	
Fall 2019	Some Basic Statistical Methods with R Implementation	2.0	92.0	
	Public Physical Education（Aikido and Practical Self-defense Course）	1.0	91.0	
	Techniques and Methods in Neurobiological Research	2.0	81.0	
	Digital Image Processing	3.0	77.0	

Credits Awarded **47.0**

----------End of Record----------

北京师范大学 教务部（研究生院）证明专用章 (3) BEIJING NORMAL UNIVERSITY

Beijing Normal University
(Official Stamp)

Grading System: Qualified (60~100), Excellent (90~100), Good (80~89), Satisfactory (70~79), Pass (60~69), Fail (0~59).
Beijing Normal University Office of Education Administration (Graduate School)

2020-09-24

证　明

王昊，学号：201821061107，生于 1996 年 4 月 9 日，现为我校心理学部　计算机应用技术专业硕士生，学制三年，入学时间为 2018 年 9 月。截至 2020 年 9 月 24 日，平均绩点为 3.6/4.0。

备注：平均绩点等于绩点成绩与学分的乘积之和除以学分之和。百分制成绩转换为绩点的方式为：绩点成绩=4-3（100-X）^{2}/1600　（60≦X≦100），其中 X 为课程百分制分数，100 分绩点为 4，60 分绩点为 1，60 分以下绩点为 0。五级制成绩转换为绩点的方式为：优秀=4.0；良好=3.6；中等=2.8；及格=1.7；不及格=0。

北京师范大学教务部（研究生院）

CERTIFICATE

This is to certify that WANGHAO (Student ID: 201821061107, Date of Birth: April 9, 1996), who was enrolled into a three-year master degree program in September 2018, is a graduate student of Computer Science and Application at Faculty of Psychology, Beijing Normal University. By the end of September 24, 2020, the student's GPA is 3.6 / 4.0.

NOTE: GPA $= \frac{\sum (Grade\ Points \times Credits)}{\sum Credits}$

The conversion between the one hundred mark system and the grade point is: Grade Points = 4-3 (100-X)^2/1600　(60 ≦ X ≦ 100), of which X is the Hundred Mark, and 100 corresponds to 4, 60 corresponds to 1, below 60 corresponds to 0.

The conversion between five-level mark system and the grade point is：Excellent = 4.0; Good = 3.6; Satisfactory = 2.8; Pass = 1.7; Fail = 0.

北京师范大学 教务部（研究生院）证明专用章 (3)

Provost's Office and Academic Affairs (Graduate School)

备注：本证明自 2020 年 9 月 1 日开始使用，供本科生、研究生在校生使用。

Note：This certificate takes effect from Sept.1st, 2020 and is applicable for undergraduate students and graduate students.