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[Homepage Link](#)  
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## INTRODUCTION

I am an integrated Ph.D. student advised by [Noseong Park](#) in the Dep. of *Artificial Intelligence* at Yonsei University. I have a broad interest in graph neural networks, recommender systems, spatio-temporal forecasting, and differential equations. Recently, I have been working on developing graph-based deep learning methods inspired by differential equations in natural science.

I was an undergrad at Jeonbuk National University (2016-2020), majoring in *software engineering*. I was privileged to be advised by [Suntae Kim](#) and [Duksan Ryu](#).

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## RESEARCH INTEREST

- Artificial Intelligence
  - Graph Neural Networks
  - Recommender Systems
  - Spatiotemporal Forecasting
  - Neural ODEs/CDEs/RDEs
- Software Engineering (SE)
  - Software Defect Prediction
  - AI based Software Analytics

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## RESEARCH EXPERIENCE

<b>Integrated Ph.D Student</b> <i>Big Data Analytics Lab (BigDyL)</i> , Yonsei University (Advisor: Prof. <a href="#">Noseong Park</a> )	<i>Aug 2020 - Now</i>
<b>Undergraduate Student Research Assistant</b> <i>AI &amp; SE Lab</i> , Jeonbuk National University (Advisor: Prof. <a href="#">Duksan Ryu</a> )	<i>Jan 2020 - Aug 2020</i>
<b>Undergraduate Student Research Assistant</b> <i>SSEL(Software System and Engineering Laboratory)</i> , Jeonbuk National University (Advisor: Prof. <a href="#">Suntae Kim</a> )	<i>Nov 2018 - Nov 2019</i>

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## EDUCATIONAL BACKGROUND

<b>Integrated Ph.D, Artificial Intelligence</b> <i>Yonsei University</i> , Seoul, Republic of Korea	<i>Sep 2020 - Now</i>
<b>Bachelor, Software Engineering</b> <i>Jeonbuk National University</i> , Jeonju, Jeollabuk Do, Republic of Korea	<i>Mar 2016 - Aug 2020</i>
• <i>magna cum laude</i> (GPA: 3.98/4.50)	

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## PUBLICATION

**Jeongwhan Choi**, Seoyoung Hong, Noseong Park and Sung-Bae Cho, "Blurring-Sharpening Process Models for Collaborative Filtering," *Proceedings of the ACM Conference on Research and Development in Information Retrieval (SIGIR)*, 2022. [[paper](#)][[code](#)][**Paper Acceptance rate: 20.1% (165/822)**]

**Jeongwhan Choi** and Noseong Park, "Graph Neural Rough Differential Equations for Traffic Forecasting," *arXiv preprint arXiv: Arxiv-2303.10909*, 2023. [[aper](#)]

**Jeongwhan Choi** and Duksan Ryu, "Graph Convolution-based Collaborative Filtering for Web Service QoS Ranking", In *Proceedings of the 25th Korea Conference on Software Engineering (KCSE 2023)*, 2023, pp. 58-67.

Hwangyong Choi, **Jeongwhan Choi**, Jeehyun Hwang, Kookjin Lee, Dongeun Lee and Noseong Park, "Climate Modeling with Neural Advection-Diffusion Equation," *Knowledge and Information Systems*, Jan. 2023. [\[paper\]](#) [IF=3.205(2021) Five year impact factor]

**Jeongwhan Choi**, Seoyoung Hong, Noseong Park and Sung-Bae Cho, "GREAD: Graph Reaction-Diffusion Equations," *arXiv preprint arXiv: Arxiv-2211.14208*, 2022. [\[paper\]](#)

Jaehoon Lee, Chan Kim, Gyumin Lee, Haksoo Lim, **Jeongwhan Choi**, Kookjin Lee, Dongeun Lee, Sanghyun Hong and Noseong Park, "Time Series Forecasting with Hypernetworks Generating Parameters in Advance," *arXiv preprint arXiv: Arxiv-2211.12034*, 2022. [\[paper\]](#)

**Jeongwhan Choi**, Seoyoung Hong, Noseong Park and Sung-Bae Cho, "Perturbation-Recovery Method for Recommendation," *arXiv preprint arXiv: Arxiv-2211.09324*, 2022. [\[paper\]](#)

Seoyoung Hong, Heejoo Shin, **Jeongwhan Choi**, and Noseong Park, "Prediction-based One-shot Dynamic Parking Pricing," In *Proceedings of the 31st ACM International Conference on Information and Knowledge Management (CIKM)*, 2022. [\[paper\]](#) [\[code\]](#)

**Jeongwhan Choi**, Hwangyong Choi, Jeehyun Hwang and Noseong Park, "Graph Neural Controlled Differential Equations for Traffic Forecasting," In *AAAI*, 2022. [\[paper\]](#) [\[code\]](#) [Regular Paper Acceptance rate: 14.2% (1,161/8,198)] [Overall Acceptance rate: 15.2% (1,370/9,020)]

Taeyong Kong, Taeri Kim, Jinsung Jeon, **Jeongwhan Choi**, Yeon-Chang Lee, Noseong Park and Sang-Wook Kim, "Linear, or Non-Linear, That is the Question!," In *Proceedings of the 15th ACM International Web Search and Data Mining Conference (WSDM)*, 2022. [\[paper\]](#) [\[code\]](#) [Regular Paper Acceptance rate: 15.8% (80/505)] [Overall Acceptance Rate: 18% (315/1,765)]

**Jeongwhan Choi** and Duksan Ryu, "Self-Supervised Learning Using Feature Subsets of Software Defect Data", In *Proceedings of the Korea Software Congress (KSC)*, Dec. 2021, pp.203-205.

Jeehyun Hwang, **Jeongwhan Choi**, Hwangyong Choi, Kookjin Lee, Dongeun Lee and Noseong Park, "Climate Modeling with Neural Diffusion Equations", In *Proceedings of the 21st IEEE International Conference on Data Mining (ICDM)*, 2021. [\[paper\]](#) [\[code\]](#) [Regular paper acceptance rate: 9.9% (98/990)] [Overall Acceptance Rate: 20% (198/990)]

**Jeongwhan Choi** and Duksan Ryu, "Bayesian Optimization Framework for Improved Cross-Version Defect Prediction", *KIPS Transactions on Software and Data Engineering (KTSDE)*, Vol. 10, No. 9, pp. 339-348, Sep. 2021.

**Jeongwhan Choi**, Jinsung Jeon, and Noseong Park, "LT-OCF: Learnable-Time ODE-based Collaborative Filtering", In *Proceedings of the 30th ACM International Conference on Information and Knowledge Management (CIKM)*, 2021. [\[paper\]](#) [\[code\]](#) [Regular paper acceptance rate: 21.7% (271/1,251)] [Overall Acceptance rate: 22% (1,101/4,989)]

**Jeongwhan Choi** and Duksan Ryu, "Bayesian Optimization Framework for Cross-Version Defect Prediction", In *Proceedings of the 23rd Korea Conference on Software Engineering (KCSE 2021)*, 2021, pp. 63-72. [Best Paper]

**Jeongwhan Choi**, Jiwon Choi, Duksan Ryu and Suntae Kim, "Improved Prediction for Configuration Bug Report Using Text Mining and Dimensionality Reduction," *Journal of KIISE*, 2021, Vol. 48, No. 1, pp. 35-42.

**Jeongwhan Choi** and Duksan Ryu, "A Study on the Applicability of Transfer Learning Techniques for Cross-Project Defect Regression," In *Proceedings of the Korea Software Congress (KSC)*, 2020, pp. 150 - 152.

**Jeongwhan Choi**, Duksan Ryu, and Suntae Kim, "Comparative Study of Transfer Learning Models for Cross-Project Automotive Software Defect Prediction," In *Proceedings of the Korea Computer Congress (KCC)*, 2020, pp. 257-259.

**Jeongwhan Choi**, Jiwon Choi, Duksan Ryu, and Suntae Kim, “Prediction for Configuration Bug Report Using Text Mining,” In *Proceedings of the 22nd Korea Conference on Software Engineering (KCSE 2020)*, 2020, pp. 350–357.

**Jeongwhan Choi**, Jiwoo Noh, and Suntae Kim, “Prediction Techniques for Difficulty Level of Hanja Using Multiple Linear Regression,” *J. Inst. Internet, Broadcast. Commun.*, vol. 19, no. 6, 2019.

Seounghan Song, **Jeongwhan Choi**, Mingu Kang, and Cheoljung Yoo, “A Software Module That Analyzes the Relationship Between Headline and Content of the Web Article: CHIMERA,” in *Proceedings of the 2019 KIIT DCS Summer Conference*, 2019, vol. 14, pp. 437–440.

**Jeongwhan Choi**, “Iceberg-Ship Classification in SAR Images Using Convolutional Neural Network with Transfer Learning,” *J. Internet Comput. Serv.*, vol. 19, no. 4, pp. 35–44, 2018.

## AWARDS & SCHOLARSHIPS

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Innovation Award, Yonsei University (Best paper in Dept. of Artificial Intelligence) *Jul 2021*

- [Media link](#)

Best Paper Awards in KCSE 2021 in Software Engineering Day *Feb 2021*

- Received the best paper award in the 23rd Korea Conference on Software Engineering (KCSE 2021)

Best Awards in Software Engineering Day *Dec 2019*

- Software Engineering Day, Dep. of Software Engineering, Jeonbun National University
- A Software Module That Analyzes the Relationship Between Headline and Content of the Web Article: CHIMERA

Best Paper Awards, Korean Institute of Information Technology *Jun 2019*

- A Software Module That Analyzes the Relationship Between Headline and Content of the Web Article: CHIMERA

The National Scholarship for Science and Engineering, KOSAF(Korea Student Aid Foundation) *2018-2019*

- This scholarship supports undergraduates with strong academic performance in science and engineering, with the purpose of developing future leaders in those fields.

Academic Excellent Scholarship *2016-2019*

- Jeonbun National University grants a scholarship for the student who has the best grade.

## TALKS

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Talk on 2023 KSIAM AI Winter School, held by Korean Society for Industrial and Applied Mathematics (KSIAM) [\[slides\]](#) [\[website\]](#) *Feb 2023*

Talk on 1st Workshop on AI held by Yonsei Univ. [\[slides\]](#) [\[poster\]](#) *Oct 2022*

Poster presentation for AIGS Symposium 2022 held at the COEX Grand Ballroom [\[poster\]](#) *Aug 2022*

Invited talk on Top-conference session, Korea Computer Congress (KCC 2022) [\[slides\]](#) *Jul 2022*

Tutorial on Korea Artificial Intelligence Association (KAIA) *Nov 2021*

- Topic: "Graph-based Collaborative Filtering and Neural ODEs"
- This talk is part of a tutorial called "Deep Learning Inspired by Differential Equation" [\[slides\]](#).

## SERVICE

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- Reviewer in KDD 2023
- Reviewer in Applied Artificial Intelligence
- Reviewer in Learning on Graph Conference (LoG) 2022
- Reviewer in IEEE Transactions on Intelligent Transportation Systems
- Reviewer in ICDM 2021, 2022

## PATENT AND S/W PROGRAM

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[Issued Patent] Apparatus and Method for Processing Spatiotemporal Data Based on Graph Neural Controlled Differential Equations, Noseong Park, **Jeongwhan Choi**, Jeehyun Hwang, Hwangyong Choi, U.S.A. Patent(Issued Number: 18/085,109). 2022.12.20 *Dec 2022*

[Issued Patent] Apparatus and Method for Processing Spatiotemporal Data Based on Graph Neural Controlled Differential Equations, Noseong Park, **Jeongwhan Choi**, Jeehyun Hwang, Hwangyong Choi, Domestic Patent(Issued Number: 10-2022-0151819). 2022.11.14 *Nov 2022*

[S/W] LT-OCF: Learnable-Time ODE-based Collaborative Filtering, Korea Copyright Commission, C-2021-052779, 2021.12. *Dec 2021*

[Issued Patent] Apparatus and Method for Collaborative Filtering Based on Learnable-Time Ordinary Differential Equation, Noseong Park, **Jeongwhan Choi**, Jinsung Jeon, Japan Patent(Issued Number: 2021-215162). 2021.12.28 *Dec 2021*

[Issued Patent] Apparatus and Method for Collaborative Filtering Based on Learnable-Time Ordinary Differential Equation, Noseong Park, **Jeongwhan Choi**, Jinsung Jeon, U.S.A. Patent(Issued Number: 17/563,726). 2021.12.28 *Dec 2021*

[Issued Patent] Apparatus and Method for Collaborative Filtering Based on Learnable-Time Ordinary Differential Equation, Noseong Park, **Jeongwhan Choi**, Jinsung Jeon, Domestic Patent(Issued Number: 10-2021-0177928). 2021.12.13 *Dec 2021*

[Granted Patent] Apparatus and Method for Measuring Difficulty Level of Chinese Character Using Regression Analysis, Suntae Kim, **Jeongwhan Choi**, Jiwoo Noh, Domestic Patent(Application Number:10-2019-0141339 ). 2019.11. [\[link\]](#) *Nov 2019*

## CERTIFICATIONS

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**University Machine Learning Camp in Jeju**, *Jeju University* *Aug 2020*

- [See credential](#)

**IBM Blockchain Foundation for Developers** , *Coursera* *Feb 2018 - Present*

- License 5MMQUBFWE2K3 ([See credential](#))

**Machine Learning Engineer Nanodegree**, *Udacity* *Jan 2018 - Present*

- [See credential](#)

**Machine Learning**, *Coursera* *July 2017 - Present*

- License EEYYGQPCFLN7 ([See credential](#))

## SKILLS

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**Tools & Technologies,**

- PyTorch, TensorFlow, Python

- Java, C/C++, R, LaTeX, VBA, Unified Modeling Language
- Android, Matlab, Git, RSA
- MySQL, Tomcat, JSP, HTML, Javascript, JUnit

#### Industry Knowledge,

- Artificial Intelligence, Graph Neural Networks, Neural Ordinary Differential Equations (Neural ODEs), Recommender Systems, Time-series Forecasting, Spatio-temporal Forecasting, Software Defect Prediction
- Software Engineering, Object Oriented Programming, Design Pattern, Compiler, Software Testing(Static Analysis)
- Text Mining, Image Processing for SAR Image
- ARM Cortex-M3, ESP-8266

#### PROJECTS (FROM 2017 TO 2019)

Prediction for Configuration Bug Report Using Text Mining	<i>Nov 2019 - Dec 2019</i>
<ul style="list-style-type: none"> <li>• The purpose of this project is to predict the configuration bug reports using machine learning techniques and NLP.</li> </ul>	
Development of capability assessment evaluation algorithm for personalized self-study with Hanja-Chinese parallel	<i>Dec 2018 - Expected Nov 2019</i>
<ul style="list-style-type: none"> <li>• The purpose of this project is to solve the problems of existing Hanja character difficulty selection method.</li> <li>• It includes the technique for measuring the difficulty of Hanja characters using artificial intelligence.</li> <li>• It also covers personalized learning induction technique using a clustering model.</li> </ul>	
Stock Price Prediction Model Based LSTM to Maximize Return on Investment	<i>Oct 2018 - Dec 2018</i>
<ul style="list-style-type: none"> <li>• The purpose of this project is to predict the long-term stock flow based on the AI prediction model and to derive meaningful ROI.</li> <li>• This project has a paper which is not submitted.</li> <li>• <a href="#">See project</a></li> </ul>	
Advanced Lane Finding Project	<i>Jul 2018</i>
<ul style="list-style-type: none"> <li>• The goal is to find the lane line using advanced techniques.</li> <li>• <a href="#">See project</a></li> </ul>	
Vehicle Detection	<i>Jul 2018</i>
<ul style="list-style-type: none"> <li>• The Software Pipeline to Detect Vehicles in a Video.</li> <li>• <a href="#">See project</a></li> </ul>	
Clone Driving Behavior	<i>Jun 2018</i>
<ul style="list-style-type: none"> <li>• The goal is to clone driving behavior via the CNN model.</li> <li>• <a href="#">See project</a></li> </ul>	
Recipe Assistant App	<i>Apr 2018 - Jun 2018</i>
<ul style="list-style-type: none"> <li>• This project is the recipe assistant app which helps people to cook an easy way.</li> <li>• <a href="#">See project</a></li> </ul>	
Tic-Tac-Toe game for LPC 1768	<i>Jun 2018</i>
<ul style="list-style-type: none"> <li>• This project is the Tic-Tac-Toe Game using ARM Cortex-M3(LPC 1768)</li> <li>• <a href="#">See project</a></li> </ul>	

## Lane Finding Project

*Mar 2018*

- The goal is to find the lane lines on the road.
- [See project](#)

## Iceberg Classifier

*Jan 2018*

- The goal is to create an image classification model that finds icebergs among SAR images collected by satellites.
- This project has a paper published in JICS.
- [See project](#)

## Helicopter Battle Game

*Apr 2017 - Jul 2017*

- This project is the game improvement project in Java.
- [See project](#)

## Smart Mailbox

*Sep 2017 - Dec 2017*

- This project is the smart mailbox notifies a user when a new mail arrives at the mailbox.
- [See project](#)