

# Hyeongchan Kim

<https://github.com/kozistr>, <http://kozistr.tech/about>

## EDUCATION

Korea University of Technology and Education

Mar 2016 –

## CHALLENGES & AWARDS

### Kaggle Challenges :: Competition Expert

- top 3% **American Express – Default Prediction** (145 / 4935), 2022.
- top 1% **Google Brain – Ventilator Pressure Prediction** (20 / 2605), 2021.
- top 4% **SIIM-FISABIO-RSNA-COVID-19 Detection** (47 / 1305), 2021.
- top 7% **Shopee – Price Match Guarantee** (166 / 2426), 2021.
- top 2% **Cornell Birdcall Identification** (24 / 1395), 2020.
- top 9% **ALAKSA2 Image Steganalysis** (93 / 1095), 2020.
- top 4% **Tweet Sentiment Extraction** (84 / 2227), 2020.
- top 4% **Flower Classification with TPUs** (27 / 848), 2020.
- top 4% **Bengali.AI Handwritten Grapheme Classification** (67 / 2059), 2020.
- top 3%, **Kannada MNIST Challenge** (28 / 1214), 2019.

### Domestic Challenges

- 6<sup>th</sup> place, **NAVER NLP Challenge**, SRL Task, 2018.
- 4<sup>th</sup> / 13<sup>th</sup> place, **NAVER A.I Hackathon**, 2018.
- Final Round (Digital Forensic), **A.I R&D Challenge**, 2018.
- 9<sup>th</sup> place (3<sup>rd</sup> price, A book as an award), **TF-KR MNIST Challenge**, 2017.

## PUBLICATIONS

- [1] Kim et al, [CNN ARCHITECTURE PREDICTING MOVIE RATING FROM AUDIENCE'S REVIEWS WRITTEN IN KOREAN](#). Jan. 2020.

## INDUSTRY EXPERIENCE

**Toss core**, Seoul, South Korea

Dec 2021 – Present

Data Scientist

- Developed the text classification model to categorize users' reviews (NPS).
  - Boost the analyze the feedback with rich information automatically.
  - Build the RESTful API server to infer the model for the batch job.
  - Save analysis time and labor a lot.
- Developed the robust captcha model to predict captchas.

- Light-weight CNN model to inference in real-time (about *1000 TPS* for a batch transaction, *80 ~ 100 TPS* for a sample on CPU)
- Build the augmentations to build a robust model.
- Build the RESTful API server to serve the mode in real-time on the CPU.
- In A/B (online) test, google vision OCR *vs New Captcha Model* (statistically significant p-value < 0.05)  
**Accuracy** (top-1): improved **50%p** (45% to 95%)  
**Latency** (p95): reduced by **80x** (about >1000ms to 12ms)  
**Revenue**: reduced cost about **\$7,000 ~ / year**
- Developed the model to forecast the transactions' category to purchase next month.
  - Transformer-based architecture with the transactions & user demographic.
  - Build an efficient pipeline to train the large tabular data (about 500GB).
  - In A/B (online) test, *previous ML model vs AdsClassifier* (statistically significant p-value < 0.05)  
 Soon!
- Developed the CSS model.
  - EDA to find the useful features correlated with the overdue users.
  - Build the robust CV & ensemble strategy in an aspect of the on/offline performance.
  - Achieved the targeted **default rate 1%**.
- Developed the transaction category classification model.
  - Transformer-based architecture, about 900 TPS on a single GPU.
  - Handle noisy-text (transaction) & label, class-imbalanced problem.
  - Help to boost the accuracy of the ads category, which increases the revenue in a roundabout way.
- Working as full-time.

**Watcha**, Seoul, South Korea

Jun 2020 – Dec 2021

Machine Learning Researcher

- Developed a new sequential recommendation architecture. (named *Trans4Rec*)
  - Newly proposed transformer architecture to improve the performance in a general manner.
  - Apply proper post-processing logic to the model.
  - In A/B (online) test, *FutureFLAT vs Trans4Rec* (statistically significant p-value < 0.01)  
**Click Ratio**: improved **1.01%+**
- Developed a music recommendation system (prototype)

- Developed a training recipe to train sequential recommendation architecture robustly. (In-service), (named *FutureFLAT*)
  - Build a new module to understand better at the time of inference.
  - Applying augmentations to the various features, leads to performance gain and robustness.
  - In A/B (online) test, *FLAT* vs *FutureFLAT* (statistically significant p-value < 0.05)
    - **Compared to the previous model, there's been no (statistically significant) change.**
    - However, it still seems to be better on the **offline metrics & training stability**. So, we chose to use it.
  - In A/B (online) test, *Div2Vec* vs *FutureFLAT* (statistically significant p-value < 0.05)
    - \***Viewing Days (mean):** improved **1.012%+**
    - \***Viewing Minutes (median):** improved **1.015%+**
- Developed the model to predict users' view-time of the contents.
  - Predict how many and how much time people are going to watch the content before the content supplied.
  - Find out which features impact users' watches.
- Developed the pipeline to recognize the main actors from the poster & still-cut images.
  - Utilize SOTA face detector & recognizer.
  - Optimize pre/post-processing routines for low latency.
- Developed a novel sequential recommendation architecture to recommend what content to watch next. (In-service), (named *FLAT*)
  - Achieve SOTA performance compared to previous SOTA architectures (e.g. *BERT4Rec*).
  - In A/B (online) test, *previous algorithm* vs *FLAT* (statistically significant p-value < 0.05)
    - Paid Conversion:** improved **1.39%p+**
    - \***Viewing Days (mean):** improved **0.25%p+**
    - \***Viewing Minutes (median):** improved **4.10%p+**
    - Click Ratio:** improved **4.30%p+**
    - Play Ratio:** improved **2.32%p+**
- Developed Image Super-Resolution model to upscale movie & tv posters, and still-cuts.
  - Optimize the codes for low latency & memory efficiency on the CPU.
  - An internal evaluation (qualitative evaluation by the designers), it catches details better & handles higher resolution & takes a little time.
- Working as full-time.

% **\*Viewing Days**: how many days users active on an app each month.

% **\*Viewing Minutes**: how many minutes user watched the contents.

**Rainist**, Seoul, South Korea

Nov 2019 – Jun 2020

Machine Learning Engineer

- Developed the category classification model of card transactions, and designed lightweight purpose for low latency. (In service)
  - In A/B (online) test (statistically significant p-value < 0.05)  
**\*Accuracy**: improved about **25 ~ 30%p**
- Developed the RESTful API server to serve (general purpose) machine learning models.
  - About 1M MAU service, 500K ~ 1M transactions / day. (1 transaction = about 100 samples)
  - Utilized inference-aware framework (onnx) to reduce the latency.  
median 100 ~ 200ms / transaction
  - **zero failure rate** (zero 40x, 50x error)
  - Deployed & managed with Kubernetes.
- Developed the classification model for forecasting the possibility of loan overdue.
- Worked as full-time.

% **\*Accuracy**: how many people don't update/change their transactions' category.

**VoyagerX**, Seoul, South Korea

Jan 2019 – Sep 2019

Machine Learning Engineer

- Developed speaker verification & diarization models to recognize the arbitrary speakers recorded from noisy environments.
- Developed a semantic image segmentation model to identify a region of hair.
- Developed an image in-paint model to remove hair naturally from the face.
- Worked as an intern.

**ELCID**, Pangyo, Korea

Jun 2016 - Aug 2016

Penetration Tester

- Penetrated some products related to network firewall and anti-virus products.
- Worked as a part-time job.

## OUTSOURCING

**Korea University Course Information Web Parsing**, ITL July 2017 – Mar 2018  
**AWS CloudTrail logger analyzer / formator**, ELCID Sep 2019 – Oct 2019

## RESEARCH EXPERIENCE

**Heterogeneous Parallel Computing Lab**, Cheonan, Korea Sep 2018 - Dec 2018

Undergraduate Research

- Wrote a paper about the CNN architecture, which utilizes a channel-attention method to TextCNN model, brings performance gain over the task while keeping its latency, generally.
- Handling un-normalized text with various convolution kernel sizes and spatial dropout.

## TALKS

**NAVER NLP Workshop 2018**, Pangyo, Korea Dec 2018

- SRL Task, challenging without any domain knowledge. Presented about trials & errors during the competition.

## PROJECTS

### Generative

**Awesome Generative Adversarial Networks (Stars 730+)** July 2017 –  
Implement lots of Generative Adversarial Networks in TF 1.x. & 2.x. Novelty of this project is implementing lots of GANs in TF 1.x & 2.x based on the papers with some tweaks.

**gan-metrics (Stars 5)** Mar 2020 –  
Implement lots of metrics for evaluating GAN in PyTorch.

### I2I Translation

**Improved Content Disentanglement (Stars 3+)** Sep 2019  
Re-implement / tune 'Content Disentanglement' paper in PyTorch.

### Image Inpainting

**Improved Edge-Connect (Stars 9)** Oct 2019  
Re-implement / tune 'Edge-Connect' paper in PyTorch.

### Style Transfer

**Neural Image Style Transfer** Mar 2018  
Implement a neural image style transfer.

### Segmentation

**Awesome Segmentation (Stars 65+)** Aug 2018  
Implement lots of image semantic segmentation and ordered the papers.

Optimizer	<b>pytorch-optimizer (Stars 55+)</b>	Sep 2021-
	Bunch of optimizer implementations in PyTorch with clean-code, strict types. Also, including useful optimization ideas. Most of the implementations are based on the original paper, but I added some tweaks.	
	<b>AdaBound Optimizer (Stars 40+)</b>	Jan 2019
	Implement AdaBound Optimizer (Luo et al. 2019) w/ some tweaks in Tensorflow.	
	<b>RAdam Optimizer (Stars 4+)</b>	Sep 2019
	Implement RAdam Optimizer (Liu et al. 2019) w/ some tweaks in Tensorflow.	
Super Resolution	<b>Deep Residual Channel Attention Network (Stars 40+)</b>	Sep 2018
	Implement a RCAN model in Tensorflow.	
	<b>Enhanced Super Resolution GAN (Stars 30+)</b>	Jun 2019
	Implement an ESRGAN model in Tensorflow.	
	<b>Natural and Realistic SISR w/ Explicit NMD (Stars 5+)</b>	Apr 2020
	Implement a NatSR model in PyTorch.	
NLP	<b>Improved TextCNN (Stars 4+)</b>	Dec 2018
	Implement an improved TextCNN model (Kim et al. 2020)	
	<b>Text Tagging</b>	Dec 2018
	Implement a text category classifier in Tensorflow.	
R.L	<b>Rosetta Stone (Stars 560+)</b>	Sep 2018-
	Hearthstone simulator using C++ w/ some R.L.	
	I contributed to the project by implementing 'feature extractor' and 'neural network' in libtorch++.	
Speech Synthesis	<b>Tacotron</b>	Jan 2019
	Implement a google tacotron speech synthesis in Tensorflow.	
Open Source Contributions	<b>syzkaller</b> :: New Generation of Linux Kernel Fuzzer <a href="#">#575</a>	

**simpletransformers** :: Transformers made simple with training, evaluating, and prediction possible with one line each

[#290](#)

**pytorch-image-models** :: Pytorch image models, scripts, pretrained weights

[#1058](#), [#1069](#)

**deit** :: DeiT Data-efficient Image Transformers

[#140](#), [#147](#), [#148](#)

**MADGRAD** :: MADGRAD Optimization Method

[#11](#)

**tensorflow-image-models** :: Tensorflow Image Models (tfimm) is a collection of image models with pretrained weights, obtained by porting architectures from timm to Tensorflow

[#61](#)