

Gürkan Soykan

AI Researcher, Software Engineer

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Introduction

I am an AI scientist and researcher with a strong computer science and natural sciences foundation. My journey began in Materials Science research before my passion for coding led me into software development. I completed my MSc at Koç University, where I focused on multimodality in comics and Natural Language Processing. Currently, I am pursuing a PhD at Wageningen University, where I work on adaptive digital twins for precision agriculture. My work continues to be driven by a dedication to digital transformation and the advancement of AI technologies.

Work Experience

Ph.D. Candidate / Information Technology Group, Wageningen University

2024 July – Present

Engaged in developing Adaptive Digital Twins for Precision Agriculture, focusing on integrating sensor data with AI techniques such as deep learning and reinforcement learning.

AI Researcher / KUIS AI Center, Koç University

2020 September – 2024 July

Completed my Master's degree and began my Ph.D. studies before transitioning to a new academic pursuit. During my involvement with the KUIS AI Center, a collaborative initiative between Koç University and İş Bankası dedicated to AI technology development. I have developed various projects using AI on comics during my master's. Projects outside the thesis scope:

- Self-Supervised Face Generation using Panel Context Information: Developed contextual comic face image generation using VAE and GANs.
- Multi-modal Emotion Recognition on Drawings: Improved VisualBERT to recognize emotions using visual and linguistic cues in comic scenes.

Thesis-related projects:

- A Comprehensive Gold Standard and Benchmark for Comics Text Detection and Recognition, GitHub: MMOCR toolkit OCR models were benchmarked on the "COMICS" dataset, and annotation tools and datasets were created for text detection recognition.
- Enhanced Comic Multi-Task Learning framework for detection (panel, character face & body, narrative box, speech bubble), segmentation (speech bubble, panel), association (speech bubble to character). The framework is an augmented MaskRCNN architecture.
- Identity-Aware Semi-Supervised Learning for Comic Character Re-Identification, Project based on aligning comic character face and body representations, inspired by SimCLR. Fine-tuning was performed using metric learning methods. Web-based annotation tool was developed.
- ComicBERT, multimodal transformer encoder for sequential multimodal neural comic processing with contrastive pretraining objective.

Programming languages used: Python, JavaScript, TypeScript. ML framework: PyTorch.

iOS Developer & Backend Engineer/ Carla Car Rental

2019 September – 2020 May

As a full-stack mobile developer, I maintained the iOS application and led the development of upcoming rebranding releases. My responsibilities included integrating APIs from 20+ car rental suppliers into the Kotlin and Spring Boot backend stack.

iOS Developer / NaylaLabs

2018 September – 2019 September

Actively contributed to the development of 8 iOS applications, ranging from social networking to child development apps. Roles varied from project leadership to assisting the lead and addressing UI enhancements and bug fixes. Depending on the project requirements followings are used: Swift 4, Objective-C, OOP, some design patterns such as MVC, MVP, MVVM, Auto Layout, and UIKit.

Freelance Developer

2018 February – Present

- Developed and released the first version of the Bling app using Flutter (Dart) for iOS and Android. Implemented the MVVM architecture and integrated monetization through RevenueCat. Assisted in the dockerization and deployment of diffusion-based photo generation pipeline with ComfyUI on RunPod, GPU cloud.
- Created the "Gökçeada" tour guide application for Gokceada, utilizing iOS (native, UIKit) and Android (Flutter) platforms.
- Developed financial charts UI and Discord Bots for Fingaroo iOS application with SwiftUI and Python.
- Project based freelancing with Naylalabs for various backend applications, Cielo, OBirUsta. Tech Stack: Utilized NestJS, TypeScript, and adhered to Clean Architecture and SOA Architecture principles.

Visiting Scientist/ Humboldt University of Berlin

2017 June – 2017 August

Collaborated with Prof. Christoph T. Koch on a summer project in TEM image computation for amorphous materials. Designed and implemented a deep convolutional neural network (DCNN) to fit aberration coefficients to TEM images. Trained the DCNN using synthetically generated TEM images for accurate results.

Peer Tutor/ Academic Support Program - Sabanci University

2013 September – 2013 February

Conducted Active Learning Sessions and Individual Tutorials for Science of Nature and Calculus courses, serving over 50 students in sessions.

Projects

Multimodal Emotion Recognition on Drawings/

Inzva Hackerspace - AI Projects #7

2021 October – 2022 January

Developed models to classify emotion information in drawings (comics), emphasizing the uniqueness of artistic styles. Utilized textual and visual data and integrated real-life datasets. Tech stack: PyTorch, PyTorch Lightning, Hydra, WandB.

Self-Supervised Face Generation using Panel Context Information/

Deep Unsupervised Learning - COMP 547 by Assoc. Prof. Aykut Erdem

2021 January – 2021 June

Developed a model to generate masked faces of characters in sequential comics frames, harnessing generative models' advancements and digital comic repositories. Employed Generative Adversarial Networks (GANs), Variational Auto-Encoders (VAEs), and created a new Face Detection dataset for the project.

Deep Learning-Based Object Recognition for Wide-Area Surveillance/

Sabancı University - TÜBİTAK

2016 September – 2017 June

Undergraduate Project: Developed generic object recognition models for detecting objects in aerial images using a transfer learning strategy. This was an industry-focused project to be supervised jointly with TÜBİTAK-BİLGEM (Scientific and Technological Research Council of Turkey) and Prof. Müjdat Çetin.

Education

2024 - Present / Wageningen University, Ph.D.

Information Technology Group

Advisors: Dr. Qingzhi Liu, Dr. Önder Babur, Prof. Dr. Bedir Tekinerdogan

Research Topic: Development of Adaptive Digital Twins for Precision Agriculture, focusing on integrating sensor data with deep learning and reinforcement learning techniques to enhance the efficiency and sustainability of greenhouse farming. The project involves multi-disciplinary collaboration, applying advanced AI and software engineering methods to create smart, adaptive systems for the future of agriculture.

2023 - 2024 / Koç University, Ph.D.

Computer Science & Engineering

Advisor: Asst. Prof. Gözde Gül Şahin

Research Topic: Investigating Multilingual Instruction Tuning in Language Models (LMs) using Parameter-Efficient Fine-Tuning (PEFT) approaches with Language Typology and Expert-Driven Model Priors.

- Contributed to the project "Bridging the Gap Between Wikipedians and Scientists with Terminology-Aware Translation: A Case Study in Turkish." with an extended abstract presented at Wiki Workshop 2024.

2020 - 2023 / Koç University, M.Sc.

Computer Science & Engineering, KUIS AI Center, 3.63 GPA

Thesis Advisors: Prof. Deniz Yuret & Prof. Metin Sezgin. Thesis Title: ComicVerse: Expanding the Frontiers of AI in Comic Books with Holistic Understanding. Thesis contributions:

- Created the COMICS Text+ Dataset with 2 million+ comic text transcriptions from the golden age of comics and open-sourced text detection and recognition models.
- *A Comprehensive Gold Standard and Benchmark for Comics Text Detection and Recognition*, Gürkan Soykan, Deniz Yuret, and Tevfik Metin Sezgin (Koç University, Türkiye) Accepted at

MANPU 2024, the 6th International IAPR Workshop on coMics ANalysis, Processing and Understanding organized in conjunction with ICDAR2024.

- Enhanced a Multi-Task Learning framework for comic character tasks (detection, segmentation, association), achieving SOTA results.
 - *Spatially Augmented Speech Bubble to Character Association via Comic Multi-Task Learning*, Gürkan Soykan, Deniz Yuret, and Tevfik Metin Sezgin (Koç University, Türkiye) Accepted at MANPU 2024, the 6th International IAPR Workshop on coMics ANalysis, Processing and Understanding organized in conjunction with ICDAR2024.
- Developed Identity-Aware Semi-Supervised Learning for Comic Character Re-Identification, introducing new comic character datasets.
- Introduced transformer based multimodal Comicsformer architecture and ComicBERT, excelling in text and visual neural comic comprehension tasks.
 - *ComicBERT: A Transformer Model and Pre-training Strategy for Contextual Understanding in Comics*, Gürkan Soykan, Deniz Yuret, and Tevfik Metin Sezgin (Koç University, Türkiye) Accepted at MANPU 2024, the 6th International IAPR Workshop on coMics ANalysis, Processing and Understanding organized in conjunction with ICDAR2024.

2016 - 2016 / The Hong Kong University of Science and Technology

Computer Science & Engineering

Attended to the HKUST as an exchange CS student for spring 2015-2016 term. Completed coursework in Algorithms, Operating Systems, and Software Engineering.

2013 - 2018 / Sabancı University, Double Major

Computer Science & Engineering, 3.51 GPA

2012 - 2017 / Sabancı University, B.Sc.

Materials Science & Nano Engineering, 3.58 GPA

Teaching Experience

Teaching Assistant for COMP 305, Algorithms and Complexity / Prof. Dr. Deniz Yuret

Fall 2021, Spring 2021, Koç University

Teaching Assistant for COMP 106, Discrete Math. for Computer Science and Engineering / Prof. Dr. Yücel Yemez

Spring 2023, Fall 2022, Spring 2022, Fall 2020, Koç University

Teaching Assistant for COMP 411/511, Computer Vision with Deep Learning / Prof. Dr. Yücel Yemez

Fall 2023, Koç University

Teaching Assistant for COMP 442/542, Natural Language Processing / Dr. Gözde Gül Şahin

Spring 2024, Koç University

Voluntary Activities

AI Programs Team Member / Inzva Hackerspace

2021 December – Present

Responsible for defining and coordinating AI program processes, as well as overseeing their execution. Also, served as a guide for the applied AI Study Groups and led NLP weeks during Google Developers Machine Learning Bootcamps in 2022 and 2023. In the 2023-2024 Mentorship Program, I

mentored two graduating undergraduates and helped curate the 12-week Deep Learning Study Group (DLSG), where I also taught a session on NLP.

IT Volunteer/ Köy Okulları Değişim Ağı Derneği (KODA)

2018 February – 2020 February

Managed website updates for KODA (Rural Schools Transformation Network) in terms of both design and content. Utilized web design and content management tools, Wix, for the updates.

Translator/ Khan Academy Türkçe (Turkish)

2016 January – 2017 September

Volunteered for translating education materials from English to Turkish.

Bootcamps

2018 / Re:Coded Bootcamp

Mobile Application Development and Tech Leadership

Completed a 6-month Android Development bootcamp with Java and pursued the Android Basics Nanodegree by Udacity to prepare for future leadership in the tech ecosystem.

2022/ Google Developers Machine Learning Bootcamp

AI Learning Program

Engaged in 4.5-month program with the Deep Learning Specialization Program, TensorFlow Certification, and Kaggle Challenge. Additionally, provided guidance and support in NLP with TensorFlow during the program.