

Graduate School of Science and Technology Master’s Thesis Abstract

Laboratory name (Supervisor)	Social Computing (Eiji Aramaki (Professor))		
Student ID	2411407	Submission date	2026 / 7 / 22
Name	ACO ELYANAH MARIE CARIAGA		
Thesis title	BiomedFig: A Diffusion-Free Multi-Agent Framework for Generating Editable Biomedical Graphical Abstracts		
Abstract			
While automated scientific figure generation for research articles has rapidly evolved in recent years with the development of multimodal large language models (MLLMs), very little existing literature has focused on the biomedical domain. Existing systems suffer from a lack of end-to-end editability and, critically, a risk of hallucinated visual content — errors that are unacceptable and potentially dangerous in biomedical publications. To this end, we propose an end-to-end multi-agent framework for generating editable graphical abstracts or visual summaries from article abstracts that composes figures exclusively from open-source, expert-crafted biomedical image assets, and decomposes figure generation into semantic planning, metadata generation and rendering, and iterative refinement. To support evaluation, we also build a dataset of paired graphical and text abstracts from open-access Cell Press articles spanning diverse life- and health-science subdomains and illustration styles. We evaluate three MLLM backbones (GPT-5.1, Gemini 3.5 Flash, Qwen3.5-27B) across 120 abstracts under 16 generation settings each (4 refinement trials x 4 asset counts) on a suite of metrics measuring layout geometry, semantic accuracy, and content grounding. We find that models improve with more assets and refinement trials and reliably identify individual entities but struggle to depict their connections, with model-specific patterns that help or hinder figure aesthetics, legibility, and faithfulness.			