University of Salerno – Italy

PhD Program in Information Engineering

PhD Thesis Evaluation Form

Name of the PhD Candidate: Francesco Rosa

Title of the PhD Thesis: Video-Conditioned Multi-Task Imitation Learning for Robotic Systems: Enhancing Robustness Through Object Centric Reasoning

Reviewer's name: George Azzopardi

Reviewer's affiliation: University of Groningen

Reviewer's e-mail address: g.azzopardi@rug.nl

Requirements for the Degree of Doctor, awarded by University of Salerno:

In order to be awarded the degree of Doctor, the candidate must have demonstrated the ability to:

1. *formulate research questions of interest on the selected topic;*
2. *carry out original scientific research;*
3. *integrate his or her research into the scientific discipline in question and put it into a broader scientific context;*

1.

2. SCIENTIFIC QUALITY OF THE PHD THESIS

(In case of a design or a thesis on applied research, please consider whether the candidate has shown technological competence, scientific rigour, intelligent application of research and design methodologies, and advanced analytical and integrative skills)

1a. Originality of the Research

Rating: very good

Please motivate your rating (wide relevance/interest of the research theme; novelty of the approach; interest for applications, etc.):

The thesis addresses a highly relevant and contemporary research theme: enhancing the robustness of robotic systems through video-conditioned multi-task imitation learning with a focus on object-centric reasoning. The novelty lies in developing a modular architecture that explicitly separates cognitive and control tasks, in contrast to end-to-end systems. The introduction of a Conditioned Object Detector (COD) for improved object recognition and a robust multi-task control system demonstrates a significant advancement in robotic adaptability and intelligence, with potential applications in industrial automation, collaborative robotics, and dynamic human-robot interaction.

1b. Scientific Quality of the (Research) Chapters

Rating: very good

Please motivate your rating (objectives well defined and scientifically supported; adequacy of the methodological approach; quality of the experimental setup; etc.):

The thesis provides well-defined objectives and systematically addresses them. The methodologies, including modular architecture design and the integration of deep learning for object detection, are scientifically robust and well-suited for the outlined problems. The experimental setups, both in simulated and real-world environments, are comprehensive and validate the proposed methods with statistically significant improvements over baseline approaches. The focus on addressing challenges like target misidentification and distractor objects further emphasizes the scientific depth of the research.

2. CANDIDATE'S REFLECTION ON THE RESEARCH AS PROVEN IN THE INTRODUCTION, GENERAL DISCUSSION, AND CONCLUSIONS

Rating: good

Please motivate your rating (contribution to knowledge in the field; quality of the results; discussion and conclusions valid and properly supported; etc.):

The thesis reflects a thorough understanding of the state-of-the-art and the candidate's ability to critically assess existing limitations in imitation learning for robotics. The conclusions drawn are well-supported by experimental results and offer meaningful insights into the broader implications of the work. However, the discussion could benefit from a deeper exploration of potential limitations and future research directions, such as scalability to more complex environments or broader task sets.

3. QUALITY OF WRITTEN PRESENTATION

Rating: very good

Please motivate your rating (is the Abstract exhaustive; suitable balance of the component parts of the thesis; adequacy of the references; clarity; communication effectiveness; etc.)

The thesis is well-structured, with a clear progression from problem definition to methodology, results, and conclusions. The abstract is exhaustive and effectively summarizes the research contributions. The references are comprehensive and up-to-date, supporting the scientific arguments presented. The use of diagrams, tables, and figures enhances clarity and communication effectiveness. Minor improvements could be made to the linguistic style for greater conciseness in some sections.

4. OVERALL ASSESSMENT

Rating: very good

Please motivate your rating:

The thesis represents a substantial and original contribution to the field of robotics, particularly in the application of multi-task imitation learning. The proposed methodologies are innovative and well-supported by empirical evidence. The research has the potential to influence both academic investigations and practical implementations in robotic systems. Overall, the thesis meets the high standards expected of a PhD dissertation.

Date : 5-Jan-2025

Signature : 

The PhD candidate will not be allowed to defend the thesis if one or more reviewers rate any of the above evaluation criteria as 'unacceptable'.

In this case, the candidate will be given a six-month period to improve the thesis following the reviewer's recommendations and submit the new version to reviewers..

Please email the completed form to the Doctorate's secretariat (dringinf@unisa.it) and to the Director (pchiacchio@unisa.it).