Inclusion of Symbolic Domain-Knowledge into Deep Neural Networks

THESIS

Submitted in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

by

Tirtharaj Dash
(ID No. 2016PHXF0421G)

Under the Supervision of
Ashwin Srinivasan

and

Co-supervision of
Sukanta Mondal

COMPUTER SCIENCE AND INFORMATION SYSTEMS

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE
PILANI – 333 031 (INDIA)

July 2022

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE
PILANI – 330 031 (INDIA)

CERTIFICATE

This is to certify that the thesis entitled "**Inclusion of Symbolic Domain-Knowledge into Deep Neural Networks**" submitted by **Tirtharaj Dash**, bearing student ID No. **2016PHXF0421G** for the award of Ph.D. degree of the institute, embodies original work done by him under our supervision.

Signature of the Supervisor	:	_____
Name	:	**ASHWIN SRINIVASAN**
Designation	:	Senior Professor
		Department of CS & IS and APPCAIR
		BITS Pilani, K.K. Birla Goa Campus
Place	:	Goa
Date	:	_____

Signature of the Co-supervisor	:	_____
Name	:	**SUKANTA MONDAL**
Designation	:	Associate Professor
		Department of Biological Sciences
		BITS Pilani, K.K. Birla Goa Campus
Place	:	Goa
Date	:	_____

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE
PILANI – 330 031 (INDIA)

DECLARATION

I, **Tirtharaj Dash**, declare that this thesis entitled "**Inclusion of Symbolic Domain-Knowledge into Deep Neural Networks**", submitted by me under the supervision of **Ashwin Srinivasan** and co-supervision of **Sukanta Mondal** is a bonafide research work. I also declare that the work carried out in this thesis has not been submitted previously in part or in full to this university or any other university or institute for award of any degree.

Signature of the Student : ————————————————

Name   :   **TIRTHARAJ DASH**

ID No.   :   2016PHXF0421G

Place   :   Goa

Date   : ————————————————

THIS THESIS IS DEDICATED TO MY GRANDPARENTS:

Shri Satyanarayan Dash (Grandfather)
Smt Sirisha Dash (Grandmother)

They were, therefore I am