VISVESVARAYA TECHNOLOGICAL UNIVERSITY,

BELAGAVI

A PROJECT REPORT ON

"KNEE OSTEOARTHRITIS ANALYSIS WITH X-RAY USING CONVOLUTION NEURAL NETWORK"

Submitted in partial fulfillment for the award of Degree of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE & ENGINEERING

By

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ALVA'S INSTITUTE OF ENGINEERING AND TECHNOLOGY

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CERTIFICATE

This is to certify that the project entitled **"KNEE OSTEOARTHRITIS ANALYSIS WITH X-RAY USING CONVOLUTION NEURAL NETWORK"** has been successfully completed by

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the bonafide students of **DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING, ALVA'S INSTITUTE OF ENGINEERING AND TECHNOLOGY** of the **VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI** during the year 2022–23. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Projectwork prescribed for the Bachelor of Engineering Degree.

Mrs. Reena Lobo **Project Guide**	**Dr. Manjunath Kotari** **Head Of the Department**	**Dr. Peter Fernandes** **Principal**

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DECLARATION

We,

KAVYA MAHESH SUREBAN

MEGHANA NEKAR

hereby declare that the dissertation entitled **"KNEE OSTEOARTHRITIS ANALYSIS WITH X-RAY USING CONVOLUTION NEURAL NETWORK"** is completed and written by us under the supervision of our guide **Mrs.Reena Lobo**, Senior Associate Professor, Department of Computer andEngineering, Alva's Institute of Engineering and Technology, Moodbidri, in partial fulfillment of requirements for the award of the degree **BACHELOR OF ENGINEERING** in **DEPARTMENT OF COMPUTER AND ENGINEERING** of the **VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAVI** during the **academic** year 2022-23. The dissertation report is original and it has not been submitted for any other degree in any university.

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ABSTRACT

Osteoarthritis (OA) is the most common disorder of the Musculo skeletal system and the major cause of reduced mobility among seniors. Clinically, knee OA severity is assessed using Kellgren & Lawrence (KL) grades, a five point scale. Previous work on automatically predicting KL grades from radio graph images were based on training shallow classifiers using a variety of hand engineered features. However, learning discriminative properties can be a challenging task, particularly when dealing with complex data such as X-ray images, typically used for knee OA diagnosis. And also we will be Detecting knee joints in X-ray images using a customized YOLOv2 model. It is more appropriate to assess the accuracy of automatic knee OA severity predictions using a continuous distance-based evaluation metric like mean squared error than it is to use classification accuracy. This leads to the formulation of the prediction of KL grades as a regression problem and further improves accuracy. Results on a dataset of X-ray images and KL grades from the Osteoarthritis Initiative (OAI) show a sizable improvement over the current state-of-the-art.

Index terms-Knee Osteoarthritis, Kellgren-Lawrence grades, CNN, Classification and Regression.