



Senior Design Project
Human Anomaly Detection

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| Sheikh Faiyaz Ahmed | ID#1511081042 |
| Faten Almee Spondon | ID#1510599042 |
| Achuyat Saha Joy | ID#1510607042 |
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Faculty Advisor

Dr. Mohammad Ashrafuzzaman Khan

Assistant Professor

ECE Department

Summer, 2019

LETTER OF TRANSMITTAL

September, 2019

To

Dr. K. M. A. Salam

Professor and Chairman,

Department of Electrical and Computer Engineering,

North South University, Dhaka.

Subject: Submission of Capstone Project on “Human Anomaly Detection”.

Dear Sir,

With due respect, we would like to submit our Capstone Project Report on “Human Anomaly Detection” as a part of our BSc program. The report deals with an optimized algorithm to detect Human Anomaly from surveillance cameras. We tried our level best to make the report meaningful and informative.

The Capstone project was very much valuable to us as it helped us to gain experience from practical field. It was a great learning experience for us. We tried to the maximum competence to meet all the dimensions required from this report.

We will be highly obliged if you are kind enough to receive this report and provide your valuable judgment. It would be our immense pleasure if you find this report useful and informative to have an apparent perspective on the issue.

Sincerely Yours,

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Sheikh Faiyaz Ahmed

Department of ECE

North South University, Bangladesh

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Faten Almee Spondon

Department of ECE

North South University, Bangladesh

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Achuyat Saha Joy

Department of ECE

North South University, Bangladesh

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Ahmed Sajid Imtiaz

Department of ECE

North South University, Bangladesh

APPROVAL

The capstone project entitled “Human Anomaly Detection” by Sheikh Faiyaz Ahmed (ID # 1511081042), Faten Almee Spondon (ID #1510599042), Achuyat Saha Joy (ID #1510607042) and Ahmed Sajid Imtiaz (ID #1510600042) is approved in partial fulfillment of the requirement of the Degree of Bachelor of Science in Computer Science and Engineering on September, 2019 and has been accepted as satisfactory.

Supervisor:

Dr. Mohammad Ashrafuzzaman Khan

Assistant Professor

Department of Electrical and Computer Engineering

North South University

Dhaka, Bangladesh.

Department Chair:

Dr. K. M. A. Salam

Professor & Chairman

Department of Electrical and Computer Engineering

North South University

Dhaka, Bangladesh

DECLARATION

This is to certify that this Project is our original work. No part of this work has been submitted elsewhere partially or fully for the award of any other degree or diploma. Any material reproduced in this project has been properly acknowledged.

Students' name & Signature

1. **Sheikh Faiyaz Ahmed**

2. **Faten Almee Spondon**

3. **Achuyat Saha Joy**

4. **Ahmed Sajid Imtiaz**

ACKNOWLEDGMENT

First of all, we wish to express our gratitude to the Almighty for giving us the strength to perform our responsibilities and complete the report.

The capstone project program is very helpful to bridge the gap between the theoretical knowledge and real-life experience as part of Bachelor of Science (BSc) program. This report has been designed to have a practical experience through the theoretical understanding.

We also acknowledge our profound sense of gratitude to all the teachers who have been instrumental for providing us the technical knowledge and moral support to complete the project with full understanding.

We would also like to sincerely thank our supervisor, Dr. Mohammad Ashrafuzzaman Khan, Assistant Professor, North South University for his persistent support, guidance, help, and encouragement during the whole process of our study and organization for the project work. We would also like to thank all our classmates who helped us with valuable information and suggestions.

ABSTRACT

Surveillance videos are able to capture a variety of realistic anomalies. In this report, we propose to learn anomalies by exploiting both normal and anomalous videos. To avoid annotating the anomalous segments or clips in training videos, which is very time consuming, we propose to learn anomaly through the deep multiple instance ranking framework by leveraging weakly labeled training videos, i.e. the training labels (anomalous or normal) are at video level instead of clip-level. In our approach, we consider normal and anomalous videos as bags and video segments as instances in multiple instance learning (MIL), and automatically learn a deep anomaly ranking model that predicts high anomaly scores for anomalous video segments. Furthermore, we introduce sparsity and temporal smoothness constraints in the ranking loss function to better localize anomaly during training.

We have used real-world surveillance videos, with 13 realistic anomalies such as fighting, road accident, burglary, robbery, etc. as well as normal activities. This dataset can be used for general anomaly detection considering all anomalies in one group and all normal activities in another group. Our experimental results show that our MIL method for anomaly detection achieves significant improvement on anomaly detection performance as compared to the state-of-the-art approaches. The low recognition performance of these baselines reveals that our dataset is very challenging and opens more opportunities for future work.