Project Title: Fire or no-fire image classification

Team Name: LongTimeNoC

**Data Science Capstone Project   
Launch Report**

Date: January 19, 2021

Team Members:

Name: Himanshu Jat

Name: Jaishankar Harshit Geddam

Name: Chingiz Mardanov

Name: Smith Amornsaensuk

# The System/Product

## System/Product Name:

Images Fire Detection

## Introduction

Fire detection is a problem that people have been trying to solve for a longtime. It is critical to detect the fire at the earliest stage in order to stop the fire and evacuate people in time. For indoor cases, there are various systems and equipment which are used such as CO2 sensors, smoke detectors, temperature sensors (heat detectors), etc. Sometimes the system alone had a failure rate of 0.32% (Carter, 2008). Nowadays, the use of security cameras has dramatically increased, with an estimation of 85 million cameras in the US in 2021 (Lin & Purnell, 2019). Leveraging the use of a security camera for early detection of fire will potentially help improve the rate of detection. The task can be effectively achieved by using deep learning algorithms to detect fire in images. Furthermore, image fire detection is also beneficial for outdoor cases such as wild fire where fire prevention systems are impossible to be installed. This project will present various deep learning models that are used to classify fire and no fire images .

## Highlighted Features

* experimenting and comparing various deep learning algorithms for image classification task

## Issues

* The computational cost to train images in neural networks is expensive.
* Parameter tuning will be another problem because training each model is time consuming.
* We may need some budgets to use cloud computing services.
* High accuracy is not promised, since there may be unforeseen problems or circumstances.

# 

# The Team

## Team Name

Fi Aag Ogon Fire

## Team Members and their specialties:

### Smith Amornsaensuk

#### Specialities

* Business management experiences
* Some deep learning projects e.g. AE, CNN, LSTM

#### Roles

* Coordinate the team members
* implement a simple deep feed-forward network
* implement deep convolutional autoencoder network to classify images

### Harshit

#### Specialities

* Vast Knowledge on Deep learning and Machine Learning algorithms

#### Roles

* Work on data acquisition and preprocessing, and also help on modelling such as implementing CNN.
* Implement exploratory data analysis

### Chingiz Mardanov

#### Specialties

* Distributed Systems Experience
* Some experience working with machine learning as well as neural networks

#### Roles

* Implementing CNN or DNN pipeline
* Validation of all the written documentation
* Developing the presentation

### Himanshu

#### Specialities

* Team leading experience on multiple successful projects
* Vast experience in modeling different kinds of datasets for Machine Learning and Deep Learning use cases

#### Roles

* Coordinate with the team members to integrate different modules and bind up the project
* Implement transfer learning powered CNN model using pre-trained weights

**Team Communication:**

[How do you communicate with each other? Provide some details about the schedules of meetings, communication tools, documents sharing, etc. It is particularly important if your team have both on-campus and online students.]

**Team Issues:**

* Large time difference for some of our group members will happen to be a limitation to how much we can communicate over the phone

# Project Plan

1. Acquire the fire image dataset from <https://github.com/DeepQuestAI/Fire-Smoke-Dataset>
2. Preprocessing the data
3. Do some EDA
4. Use Keras to build simple deep feed-forward network model
5. Midterm presentation the simple model
6. Use Keras to build deep CNN
7. Use keras to build and train AE for classification task
8. Use TF2 model
9. Use transfer learning to retrain a pre-trained imagenet model
10. Compare and conclude results of all models
11. Final presentation and report

Work Cited

Carter, Steve (2008) “Inspection, Testing and Maintenance Records: A Window into System Reliability.” <http://www.nfpa.org/~/media/files/news-and-research/resources/research-foundation/foundation-proceedings/carter.pdf?la=en>

Vlahos, James (2019) “A World With a Billion Cameras Watching You Is Just Around the Corner.” The Wall Street Journal, <https://www.popularmechanics.com/military/a2398/4236865/>

Table of Contributions

The table below identifies contributors to various sections of this document.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Section** | **Writing** | **Editing** |
| **1** | **System/Product** | **Smith, Chingiz** | **Chingiz** |
| **2** | **Team** | **Smith, Himanshu, Harshit, Chingiz** | **Himanshu** |
| **3** | **Plan** | **Smith, Himanshu** | **Harshit** |

**Grading**

The grade is given on the basis of quality, clarity, presentation, completeness, and writing of each section in the report. This is the grade of the group. Individual grades will be assigned at the end of the term when peer reviews are collected.