# WEB PHISHING DETECTION

## TEAM ID: PNT2022TMID22982


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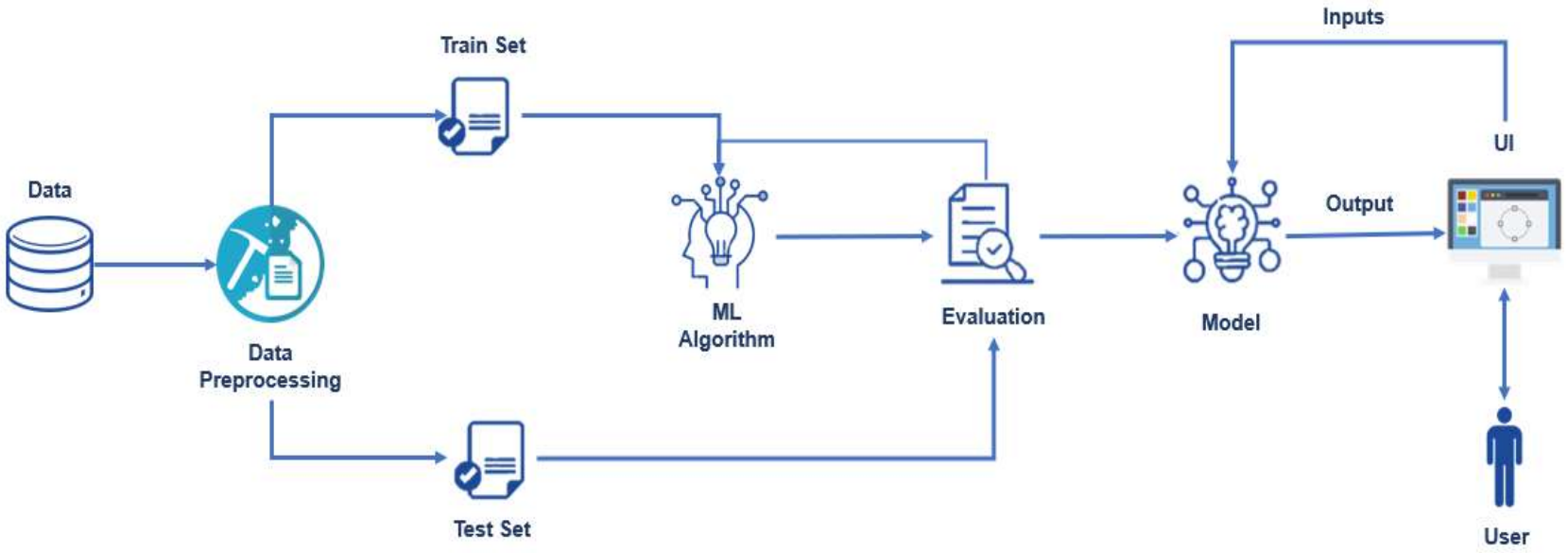
Sorna V
Swatheka R

# Problem Definition

**There are a number of users who purchase products online and make payments through e-banking. There are e-banking websites that ask users to provide sensitive data such as username, password & credit card details, etc., often for malicious reasons. This type of e-banking website is known as a phishing website. Web phishing is one of many security threats to web services on the Internet.**

**In order to detect and predict e-banking phishing websites, we proposed an intelligent, flexible and effective system that is based on using classification algorithms and techniques to extract the phishing datasets criteria to classify their legitimacy. The e-banking phishing website can be detected based on some important characteristics like URL and domain identity, and security and encryption criteria in the final phishing detection rate.**

# Technical Architecture



# Paper 1

## Authors:

**Zuochao Dou, Issa Khalil, Abdallah Khreishah, Ala Al-Fuqaha and Mohsen Guizani**

## Title:

**Systematization of Knowledge (SoK): A Systematic Review of Software-Based Web Phishing Detection**

## Published Journal:

**IEEE Communications Surveys & Tutorials**

**( Volume: 19, Issue: 4, Fourthquarter 2017)**

## Published Date:

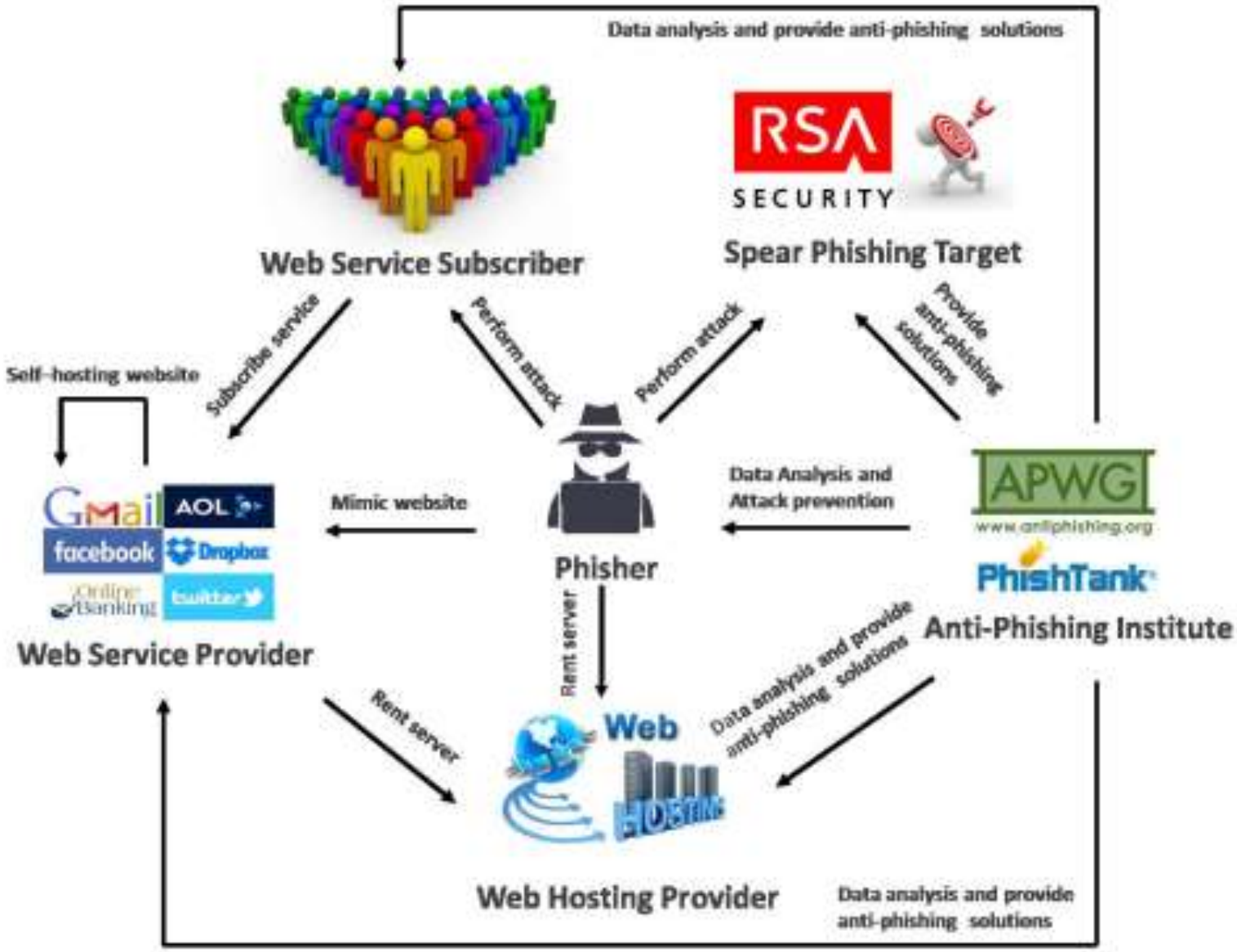
**13 September 2017**

## Objective:

**The objective of this paper is to provide a systematic understanding of existing phishing detection studies and provide a comprehensive way to evaluate phishing detection approaches from different perspectives in order to guide future developments and validations of new or upgraded anti-phishing techniques. Software-based phishing detection includes many important aspects like the phishing detection life cycle, taxonomy of phishing detection schemes, evaluation datasets, detection features, and evaluation metrics and strategies.**

## Phishing Detection Techniques:

- **Data mining algorithms**
- **Sequential Minimal Optimization (SMO)**
- **Logistic Regression (LR)**
- **Neural Network (NN)**


Data analysis and provide anti-phishing solutions
Web Service Subscriber
RSA SECURITY
Spear Phishing Target
Subscribe service
Perform attack
Perform attack
Provide anti-phishing solutions
Self-hosting website
Mimic website
Phisher
Data Analysis and Attack prevention
APWG
www.antiphishing.org
PhishTank
Anti-Phishing Institute
Web Service Provider
Rent server
Rent server
Data analysis and provide anti-phishing solutions
Web Hosting Provider
Data analysis and provide anti-phishing solutions

# Paper 2

## Authors:

Said Salloum, Tarek Gaber, Sunil Vadera and Khaled Shaalan

## Title:

A Systematic Literature Review on Phishing Email Detection Using Natural Language Processing Techniques

## Published Journal:

IEEE Access ( Volume: 10)

## Published Date:

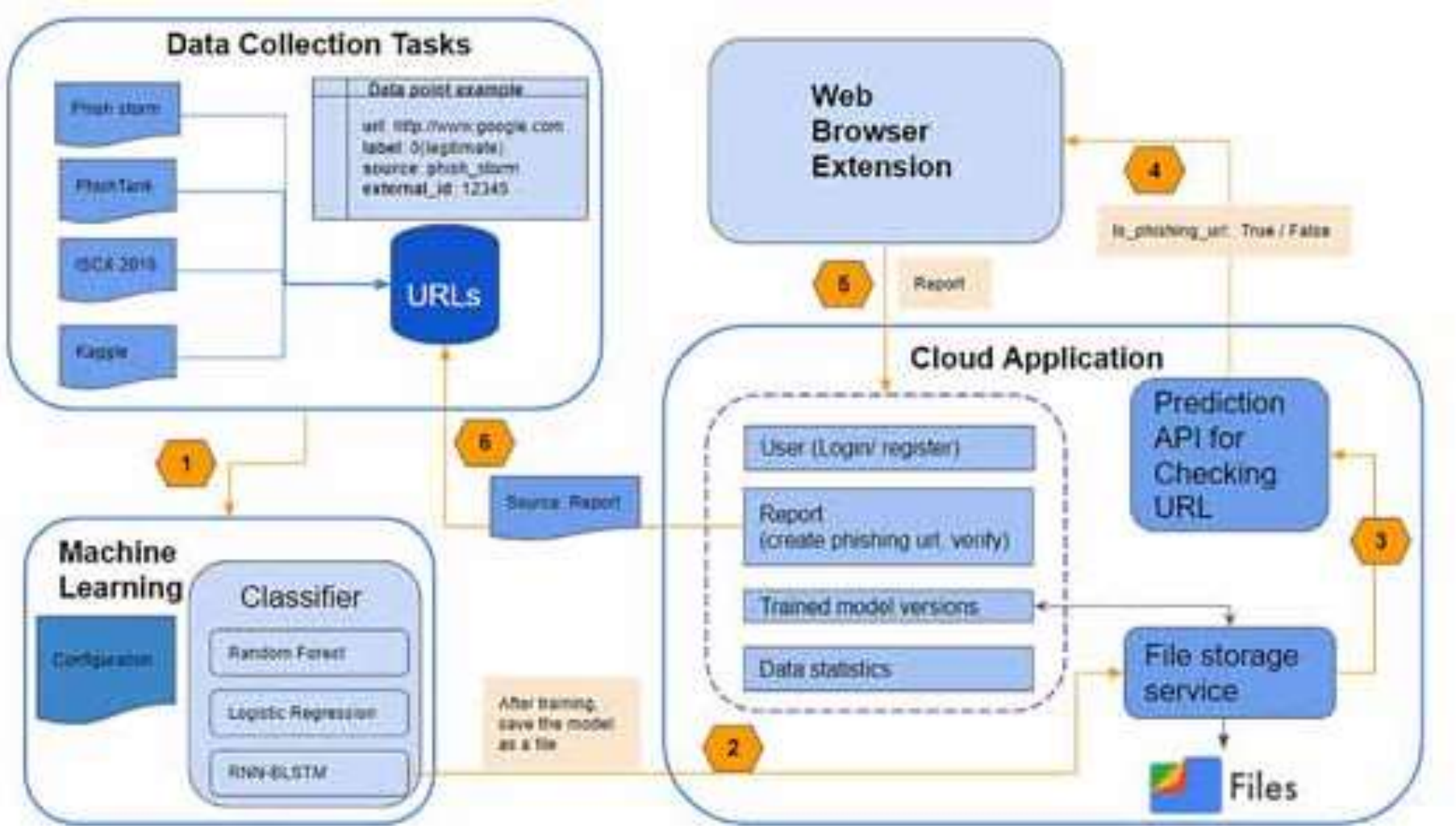
14 June 2022

## Objective:

The most common phishing attack vectors include communication channels like emails and other messaging apps. This paper offers a comprehensive literature review of studies that aim to utilize natural language processing (NLP) and machine learning (ML) methods for detecting phishing emails. The work in aimed to survey the work published using NLP and ML for detecting phishing emails but has not systematically reviewed all published papers in the last 10 years.

## Phishing Detection Techniques:

- Natural Language Processing
- Adam optimizer
- Convolutional Neural Network (CNN)
- Latent Semantic Analysis (LSA)


Data Collection Tasks
Phish storm
PhishTank
ISCX 2016
Kaggle
Data point example
url: http://www.google.com
label: 0(legitimate)
source: phish_storm
external_id: 12345
URLs
Web Browser Extension
4
Is_phishing_url: True / False
5
Report
Cloud Application
1
6
Source: Report
User (Login/ register)
Report (create phishing url, verify)
Trained model versions
Data statistics
Prediction API for Checking URL
3
Machine Learning
Configuration
Classifier
Random Forest
Logistic Regression
RNN-BLSTM
After training, save the model as a file
2
File storage service
Files

# Paper 3

## Authors:

Jian Mao, Wenqian Tian, Pei Li, Tao Wei and Zhenkai Liang

## Title:

Phishing-Alarm: Robust and Efficient Phishing Detection via Page Component Similarity

## Published Journal:

IEEE Access ( Volume: 5)

## Published Date:

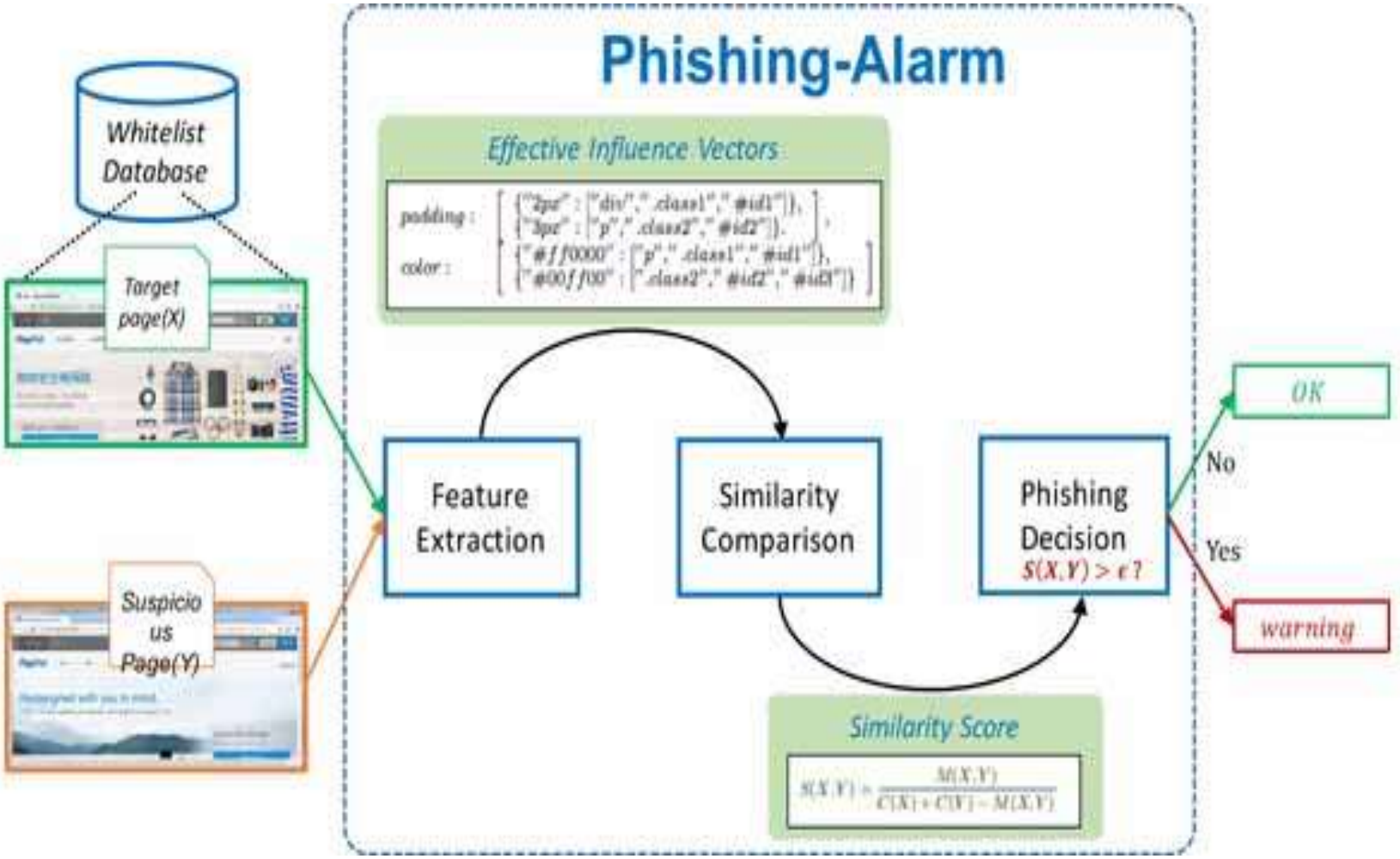
23 August 2017

## Objective:

The paper proposes a robust solution to identify phishing pages according to the visual similarity of web page components, which are difficult to be evaded by attackers. The authors developed techniques to select the effective features on a web page, and propose an efficient method for page similarity detection according to these features. Their approach was prototyped and evaluated using a large set of phishing pages. The results illustrate that the approach is efficient and effective.

## Phishing Detection Techniques:

- Phishing – alarm
- Black / White list based detection
- URL based detection
- Content based detection


Phishing-Alarm
Whitelist Database
Target page(X)
Suspicious Page(Y)
Effective Influence Vectors
padding :
color :
Feature Extraction
Similarity Comparison
Phishing Decision
S(X,Y) > ε ?
No
Yes
OK
warning
Similarity Score

# Paper 4

## Authors:

Peng Yang, Guangzhen Zhao and Peng Zeng

## Title:

Phishing Website Detection Based on Multidimensional Features Driven by Deep Learning

## Published Journal:

IEEE Access ( Volume: 7)

## Published Date:

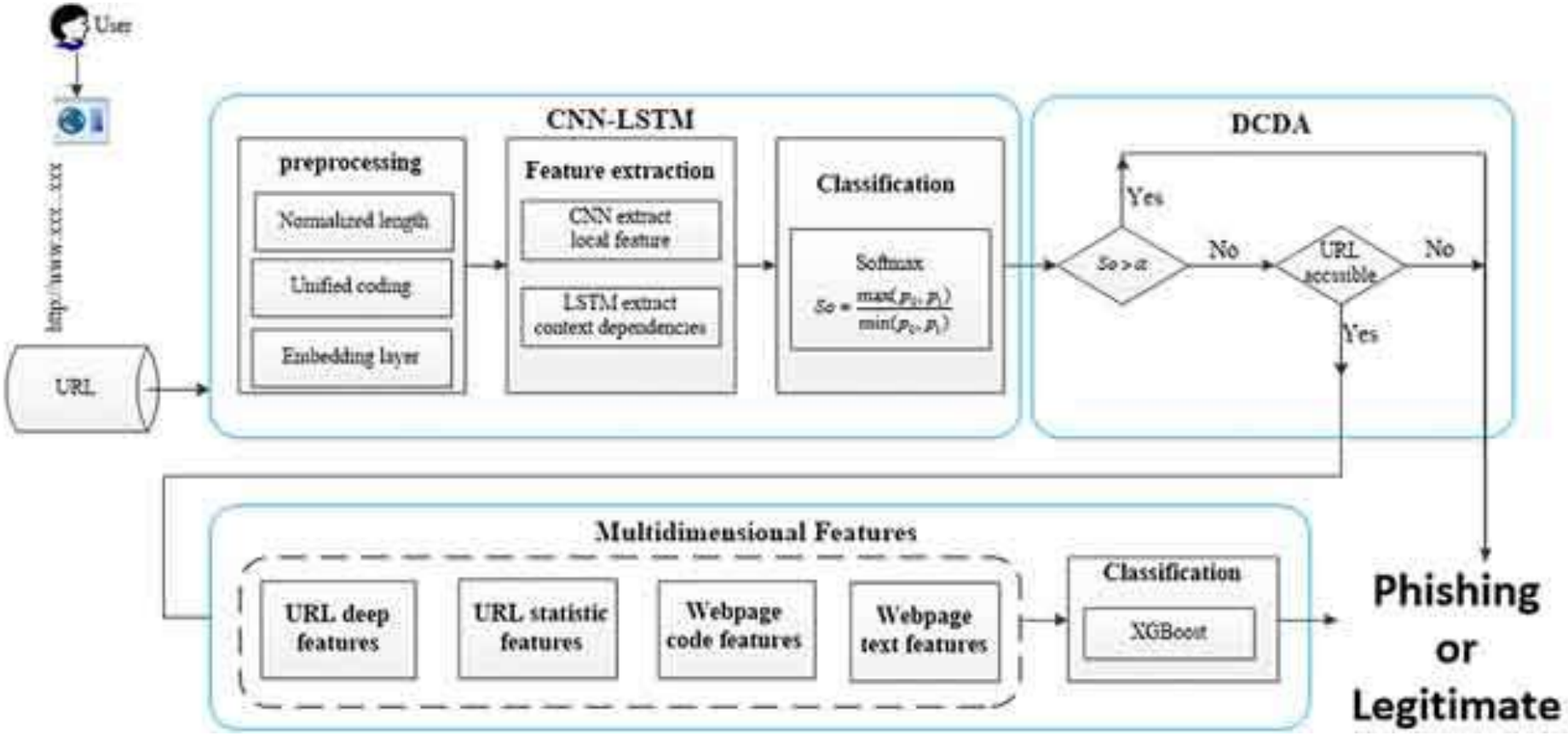
11 January 2019

## Objective:

**The APWG (Anti-Phishing Working Group) defines phishing as a criminal mechanism employing both social engineering and technical subterfuge to steal personal identity data and financial account credentials of consumers. A multidimensional feature phishing detection approach was proposed based on a fast detection method by using deep learning (MFPD). A dynamic category decision algorithm (DCDA) is proposed. By revising the output judgment conditions of the softmax classifier in the deep learning process and setting a threshold, the detection time can be reduced.**

## Phishing Detection Algorithms:

- **The CNN-LSTM Algorithm**
- **The Multidimensional Feature Algorithm**
- **The Dynamic Category Decision Algorithm**


User
http://www.xxx.xxx
URL
CNN-LSTM
preprocessing
Normalized length
Unified coding
Embedding layer
Feature extraction
CNN extract local feature
LSTM extract context dependencies
Classification
Softmax
DCDA
Yes
No
URL accessible
No
Yes
Multidimensional Features
URL deep features
URL statistic features
Webpage code features
Webpage text features
Classification
XGBoost
Phishing or Legitimate

# Paper 5

## Authors:

**Saad Al-Ahmadi, Afrah Alotaibi and Omar Alsaleh**

## Title:

**PDGAN: Phishing Detection With Generative Adversarial Networks**

## Published Journal:

**IEEE Access ( Volume: 10)**

## Published Date:

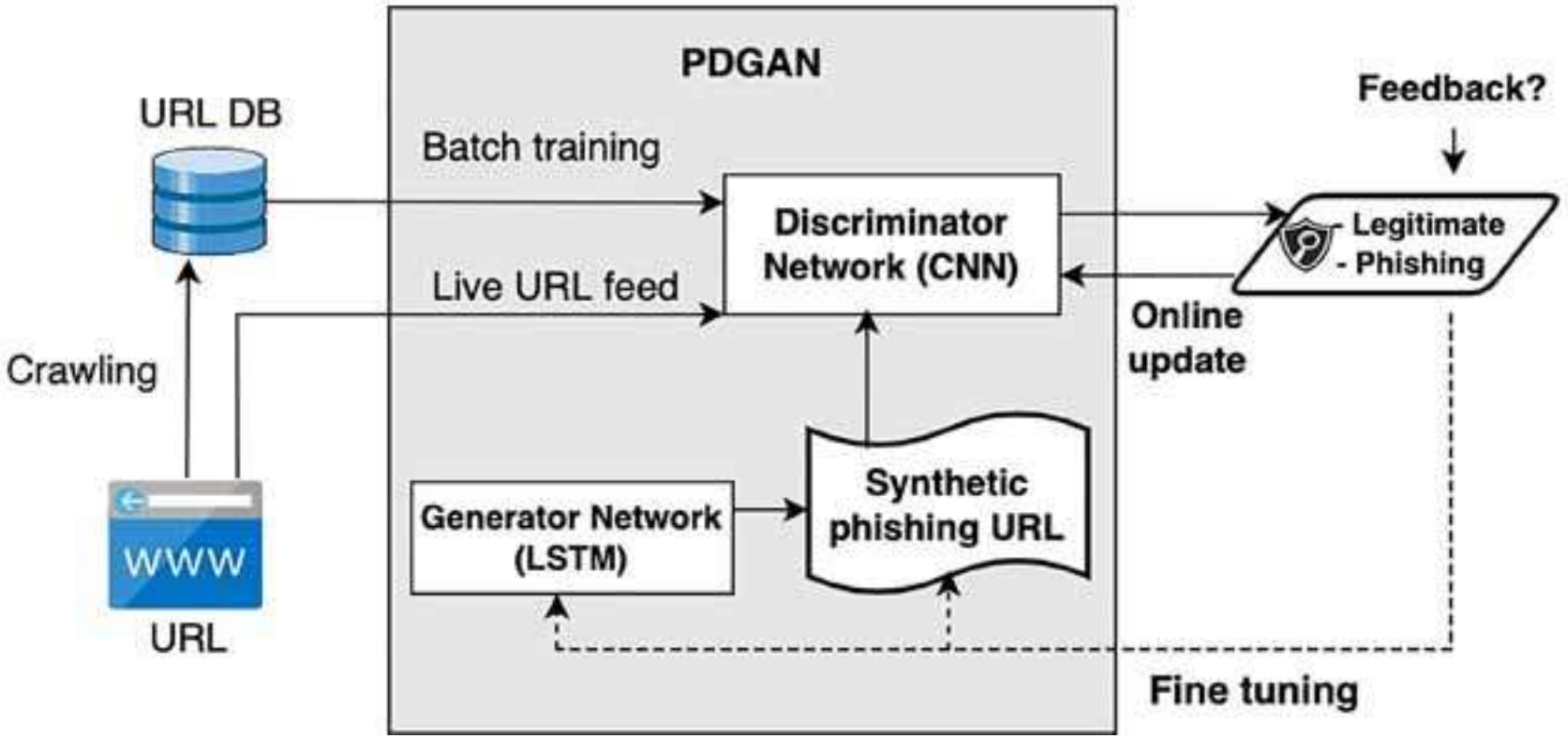
**18 April 2022**

## Objective:

A website is classified as phishing in a machine learning approach if the tested website results match the predefined feature set. The performance of this approach depends on the feature set, training data, and classification algorithm. Using machine learning algorithms can enable unseen URLs to be easily detected. A phishing website detection approach PDGAN, which does not depend on webpage content but rather only on a webpage's URL is designed. PDGAN uses a deep learning model, namely a GAN, whose adversarial process allows the model to learn different variations in phishing features and produce a final model that provides better detection results.

## Phishing Detection Techniques:

- Deep learning
- Deep Neural Network
- Long short-term memory network (LSTM)


PDGAN
URL DB
Batch training
Discriminator Network (CNN)
Feedback?
Legitimate - Phishing
Live URL feed
Online update
Crawling
Generator Network (LSTM)
Synthetic phishing URL
WWW
URL
Fine tuning

# Thank You ☺