Chapter 9
A Hybrid Approach to Detect the Malicious Applications in Android–Based Smartphones Using Deep Learning

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ABSTRACT

This modern era of technological advancements facilitates the people to possess high-end smart phones with incredible features. With the increase in the number of mobile applications, we are witnessing the humongous increase in the malicious applications. Since most of the Android applications are available open source and used frequently in the smart phones, they are more vulnerable. Statistical and dynamical-based malware detection approaches are available to verify whether the mobile application is a genuine one, but only to a certain extent, as the level of mobile application scanning done by the said approaches are in general routine or a common, pre-specified pattern using the structure of control flow, information flow, API call, etc. A hybrid method based on deep learning methodology is proposed to identify the malicious applications in Android-based smart phones in this chapter, which embeds the possible merits of both the statistical-based malware detection approaches and dynamical-based malware detection approaches and minimizes the demerits of them.

INTRODUCTION

Revolution of Smart Phones and Its Features

With the growing pace of innovative development, Smartphones have changed into the inevitable gadget of our everyday life. Smartphones are cell phones which are developed with highly advanced technologies that makes them to function more like a PC. In the past, mobile phones were used for making phone calls and sending SMS. Now, Smartphones offers much more services. They are fully facilitated to serve like a computer that is compact enough to be in the pocket. Smartphones can make voice or video calls, provide access to the internet and browse the web, take photos, upload data to the web, Navigational information can be retrieved with GPS if the phone has GPS built-in, Play back music and video stored on the phone or from the internet, store and manage your contacts and appointments, send emails, Play games, run new applications and games downloaded from the internet. The Operating System is the key feature of the smart phones that enables it to provide all expected sophistications. ("Introduction to Smart Phones," 2008). There are number of mobile Operating systems like Symbian OS, Android OS, Apple iOS, Windows OS, Blackberry OS, BADA, Maemo, MeeGo, Palm OS, Open WebOS, verdict and even more.Android, the popular smart phone OS was introduced by Google in 2008. The popularity of Android OS is because of its advanced and attractive features. The key features includes Messaging, Auto Correction and Dictionary, Web browser, Voice-based features, Multi-touch, Multitasking, Screen capture, TV recording, Video calling, Multiple language support, Android supports multiple languages, Accessibility, Bluetooth Connectivity, Tethering, various media support, Streaming media support, External storage, Hardware support, Java support, Handset layouts, Native Apps, Instant Apps. (Lekies, 2015).

The more advanced features renders more sophistication such as Battery Saver, text to speech, mobile remote which controls other devices, Screen Magnification, Guest mode access for the other users like password protected PCs, Controlling using facial movements, sharing internet access using hotspot access, fast switching between apps, Screen pinning, Dual chrome viewing options, Do not Disturb rules for having smoother meeting sessions, Notification channels for notifying the received mails, messages, updates etc, Locking the apps in foreground, One swipe for quick settings, Unlocking the phones with Bluetooth device, Zoom in with one finger, rotating maps with two fingers, taking pctures with volume rocker, actions with long press etc. (Hersey, 2017). The list extends with a numerous number of features which are very useful to the users and provides a highly sophisticated technical service anywhere in the world that one can do maximum computer oriented needs just by carrying a Smartphone. The Ability of the android OS are not restricted and are not the destiny as it is an open source and more new features will keep emerging to make it more powerful and more useful.

MOBILE APPS

Mobile phones became a part of our routine life and people feel uncomfortable to lead a normal day without a mobile. Earlier mobile phones had only few restricted functions that enabled people to make calls and send text messages. The later generation mobile phones are multifunctional that enables usage of internet, browsing, sending emails, accessing books online, sending medias over internet, playing games etc. This was possible with the help of mobile application. (Rashedul & Rofiqul, 2010). A Mobile application is shortly referred as mobile App, which is a software application developed to run in a mobile

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