



US 20230231857A1

(19) **United States**

(12) **Patent Application Publication**  
**Neupane et al.**

(10) **Pub. No.: US 2023/0231857 A1**

(43) **Pub. Date: Jul. 20, 2023**

(54) **DEEP LEARNING PIPELINE TO DETECT  
MALICIOUS COMMAND AND CONTROL  
TRAFFIC**

**Publication Classification**

(51) **Int. Cl.**  
**H04L 9/40** (2006.01)  
**G06N 3/04** (2006.01)  
(52) **U.S. Cl.**  
**CPC** ..... **H04L 63/1416** (2013.01); **H04L 63/1425**  
(2013.01); **H04L 63/145** (2013.01); **G06N**  
**3/04** (2013.01)

(71) Applicant: **Palo Alto Networks, Inc.**, Santa Clara,  
CA (US)

(72) Inventors: **Ajaya Neupane**, San Jose, CA (US);  
**Yuwen Dai**, Santa Clara, CA (US);  
**Stefan Achleitner**, Arlington, VA (US);  
**Yu Fu**, Campbell, CA (US);  
**Shengming Xu**, San Jose, CA (US)

(21) Appl. No.: **17/577,925**

(22) Filed: **Jan. 18, 2022**

(57) **ABSTRACT**

Detection of command and control malware is disclosed. A network traffic session is monitored. Automatic feature identification for real-time malicious command and control traffic detection based on a request header of the monitored network traffic session using a deep learning model is performed.

