Manuscript Number:	CLCO-D-17-00073
Full Title:	An SVM-based Framework for Detecting DoS Attacks in Virtualized Clouds under Changing Environment
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Abstract:	Cloud Computing enables providers to rent out space on their virtual and physical infrastructures. Denial of Service (DoS) attacks threaten the ability of the cloud to respond to clients' requests, which results in considerable economic losses. The existing detection approaches are still not mature enough to satisfy a cloud-based detection system's requirements since they overlook the changing/dynamic environment, that characterises the cloud as a result of its inherent characteristics. Indeed, the patterns extracted and used by the existing detection models to identify attacks, are limited to the current VMs' infrastructure but do not necessarily hold after performing new adjustments according to the pay-as-you-go business model. Therefore, the accuracy of detection will be negatively affected. Motivated by this fact, we present a new approach for detecting DoS attacks in a virtualized cloud under changing environment. The proposed model enables monitoring and quantifying the effect of resources adjustments on the collected data. This helps filter out the effect of adjustments from the collected data and thus enhance the detection accuracy in dynamic environments. Our solution correlates as well VMs' application metrics with the actual resources' load, which enables the hypervisor to distinguish between benignant high load and DoS attacks. It helps also the hypervisor identify the compromised VMs that try to needlessly consume more resources. Experimental results show that our model is able to enhance the detection accuracy under changing environments.
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```
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(preloaded format=pdflatex 2016.4.4)  29 JUN 2017 12:47
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   defining Unicode char U+00C8 (decimal 200)
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    defining Unicode char U+00A3 (decimal 163)
    defining Unicode char U+00AD (decimal 173)
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    defining Unicode char U+2022 (decimal 8226)
)
Now handling font encoding OMX ...
... no UTF-8 mapping file for font encoding OMX
Now handling font encoding U ...
... no UTF-8 mapping file for font encoding U
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      defining Unicode char U+2026 (decimal 8230)
      defining Unicode char U+2122 (decimal 8482)
      defining Unicode char U+2423 (decimal 9251)
))

! LaTeX Error: File `slashbox.sty' not found.

Type X to quit or <RETURN> to proceed,
or enter new name. (Default extension: sty)

Enter file name:
! Emergency stop.
<read *>

l.59 ^^M

*** (cannot \read from terminal in nonstop modes)


Here is how much of TeX's memory you used:
 1895 strings out of 493027
 22483 string characters out of 6137679
 84430 words of memory out of 5000000
 5482 multiletter control sequences out of 15000+600000
 3640 words of font info for 14 fonts, out of 8000000 for 9000
 1141 hyphenation exceptions out of 8191
 30i,0n,37p,239b,38s stack positions out of
5000i,500n,10000p,200000b,80000s
!  ==> Fatal error occurred, no output PDF file produced!
```

Requests serviced per second will increase by 12% if the amount of the VM's resources increases by 20%

Amount of adjustment on a VM's resources	The effect of resources adjustment on a VM's system parameter						
	CPU load	Network load	Memory load	I/O load	Requests serviced per second	Average No. of system call/Sec.	...
+5 %							...
-5%							...
+10%	+9%						...
-10%							...
+20%					12%		...
-30%							...
+30%							...
-40%		-3%				-10%	...
+40%							...
-50%							...
+50%							...
...	...	...	...	...	...	...	...

Average No. of system call/Sec. will decrease by 10% if the amount of the VM's resources decreases by 40%
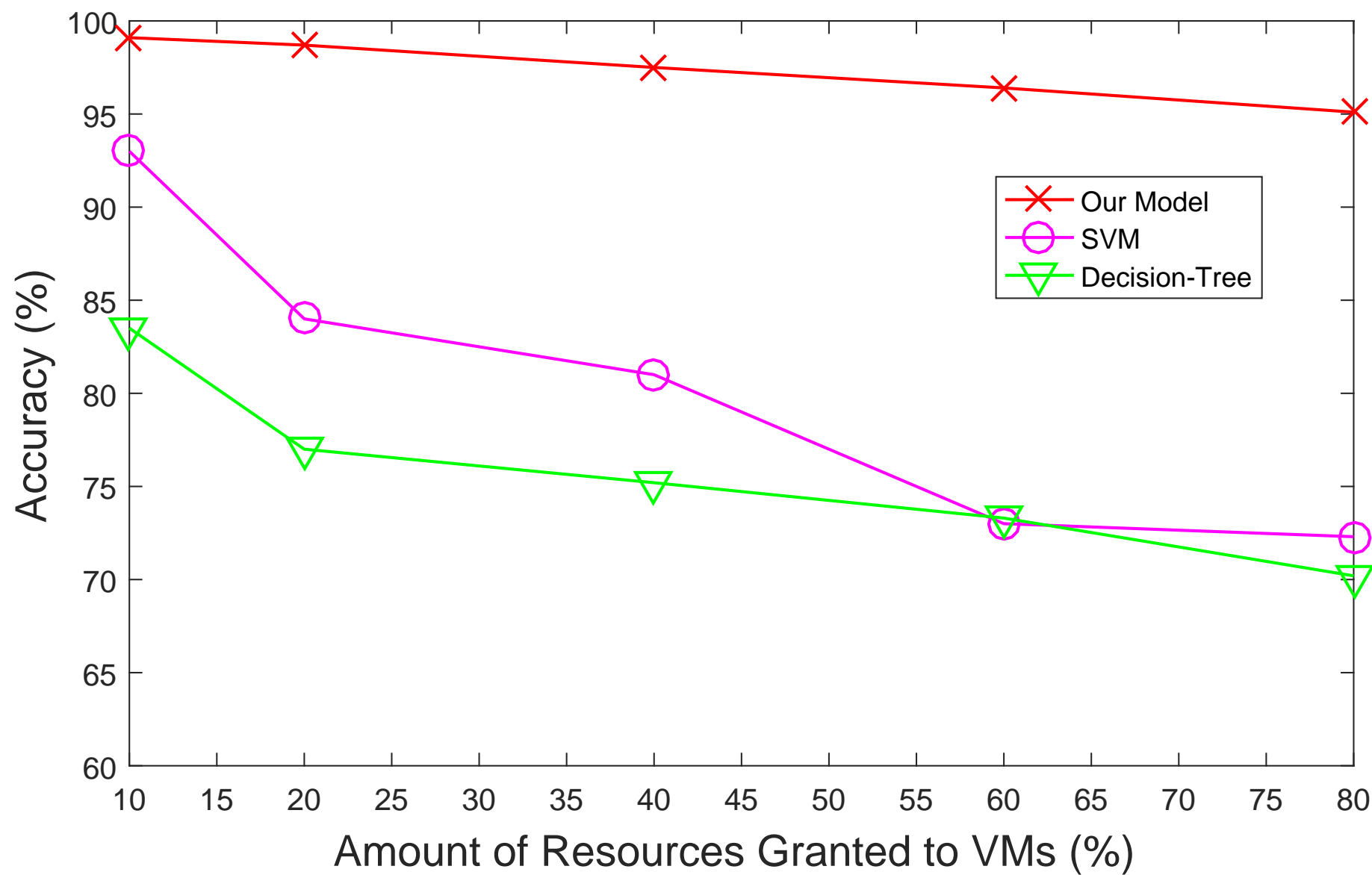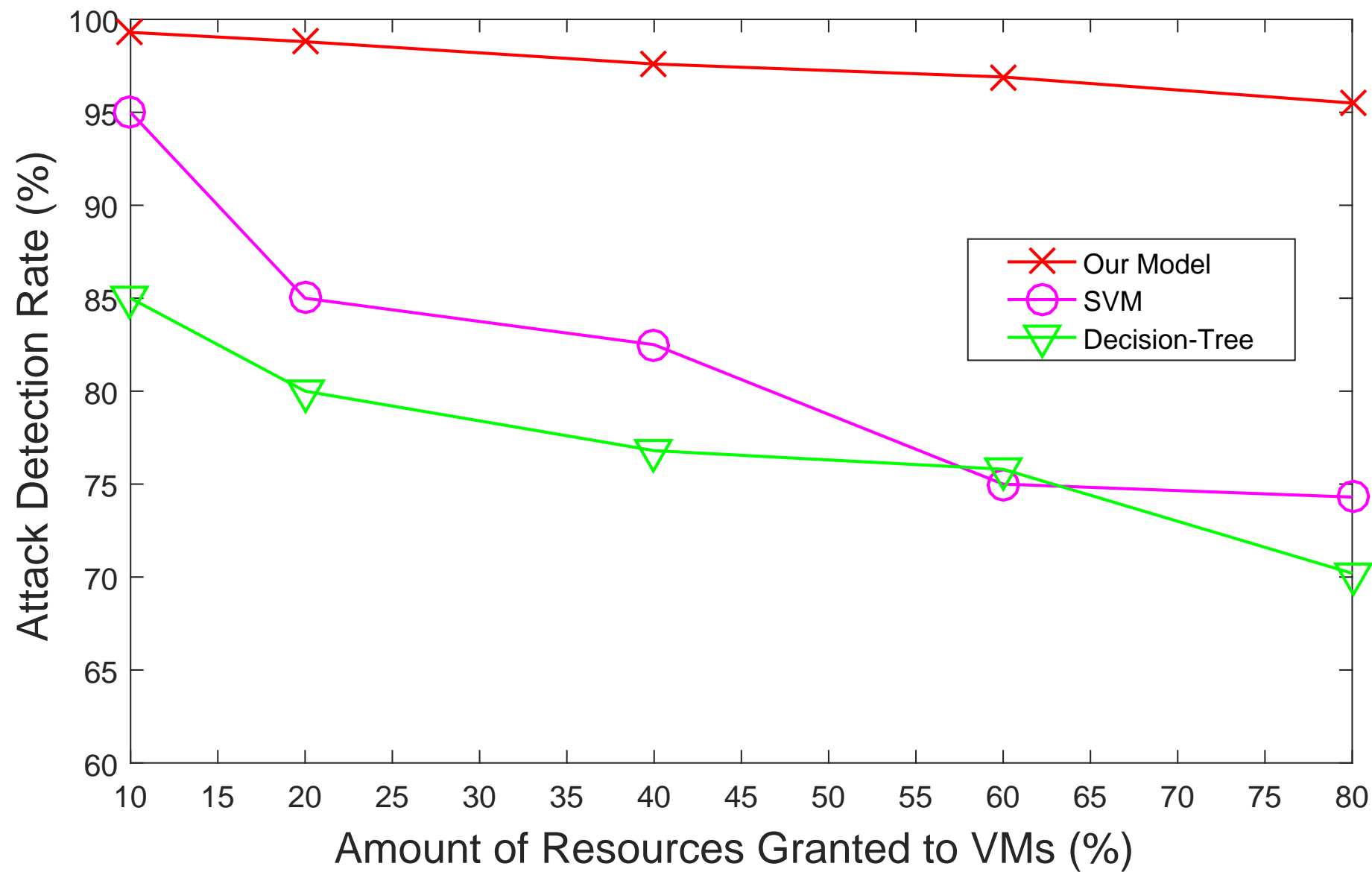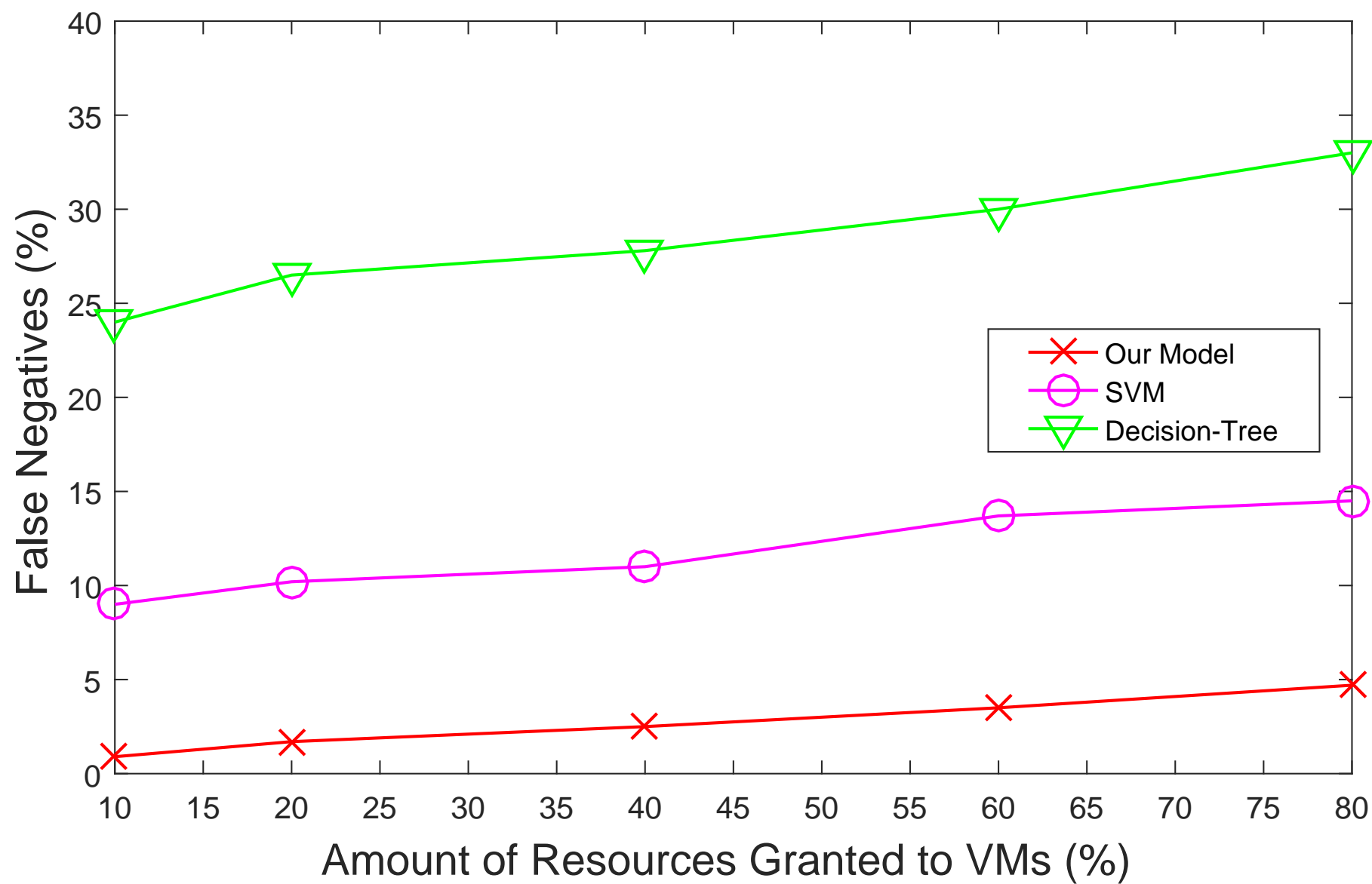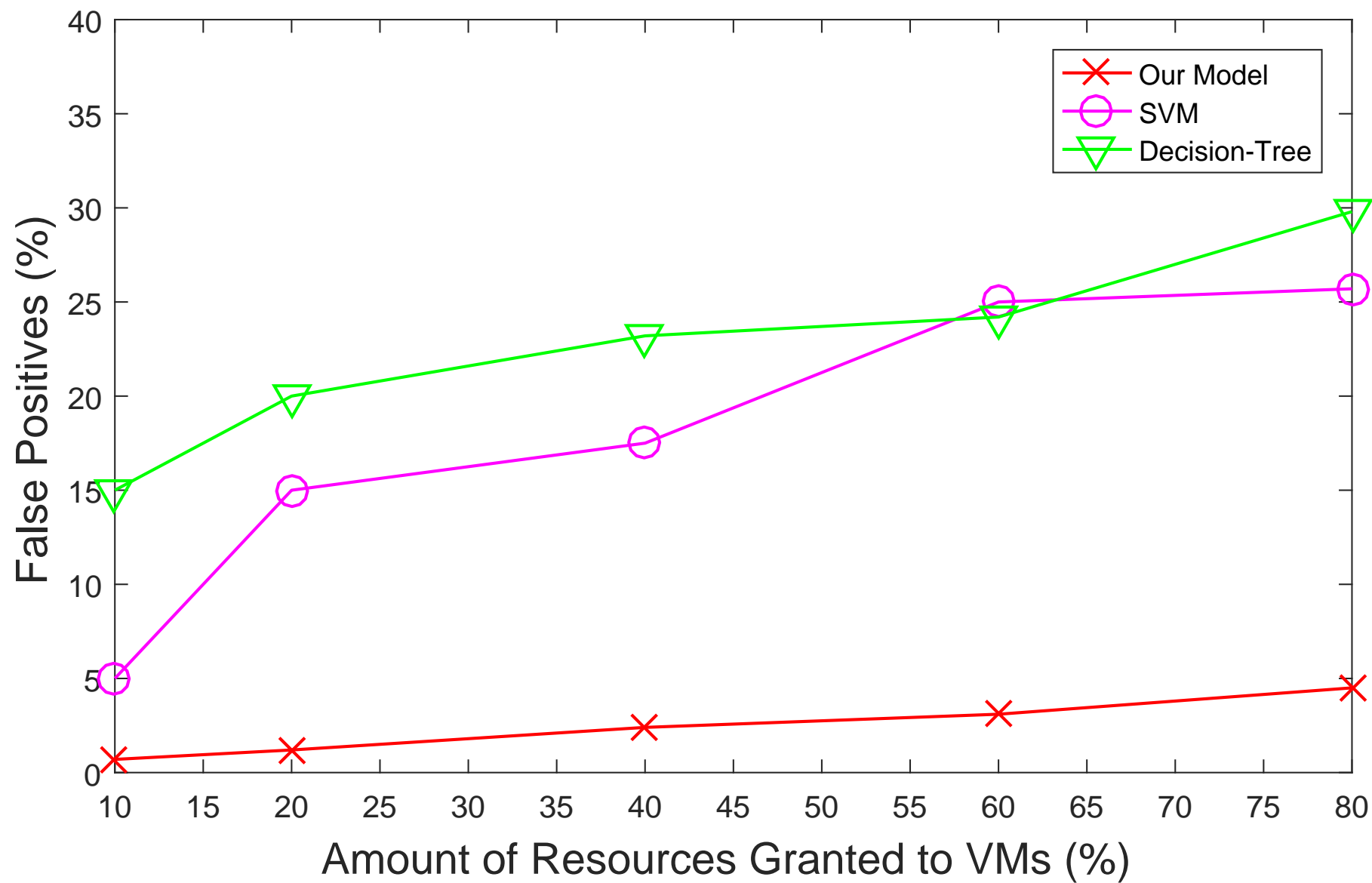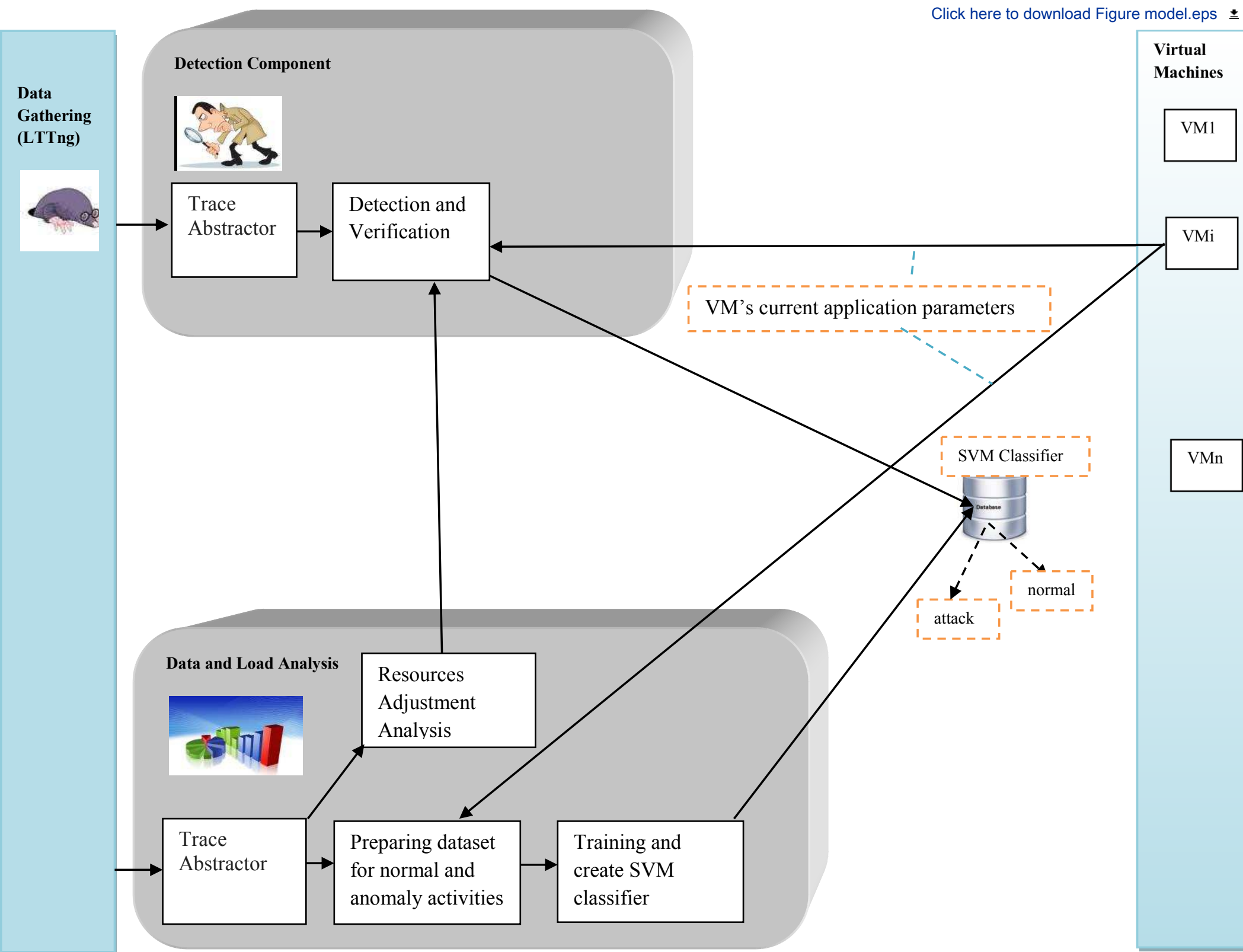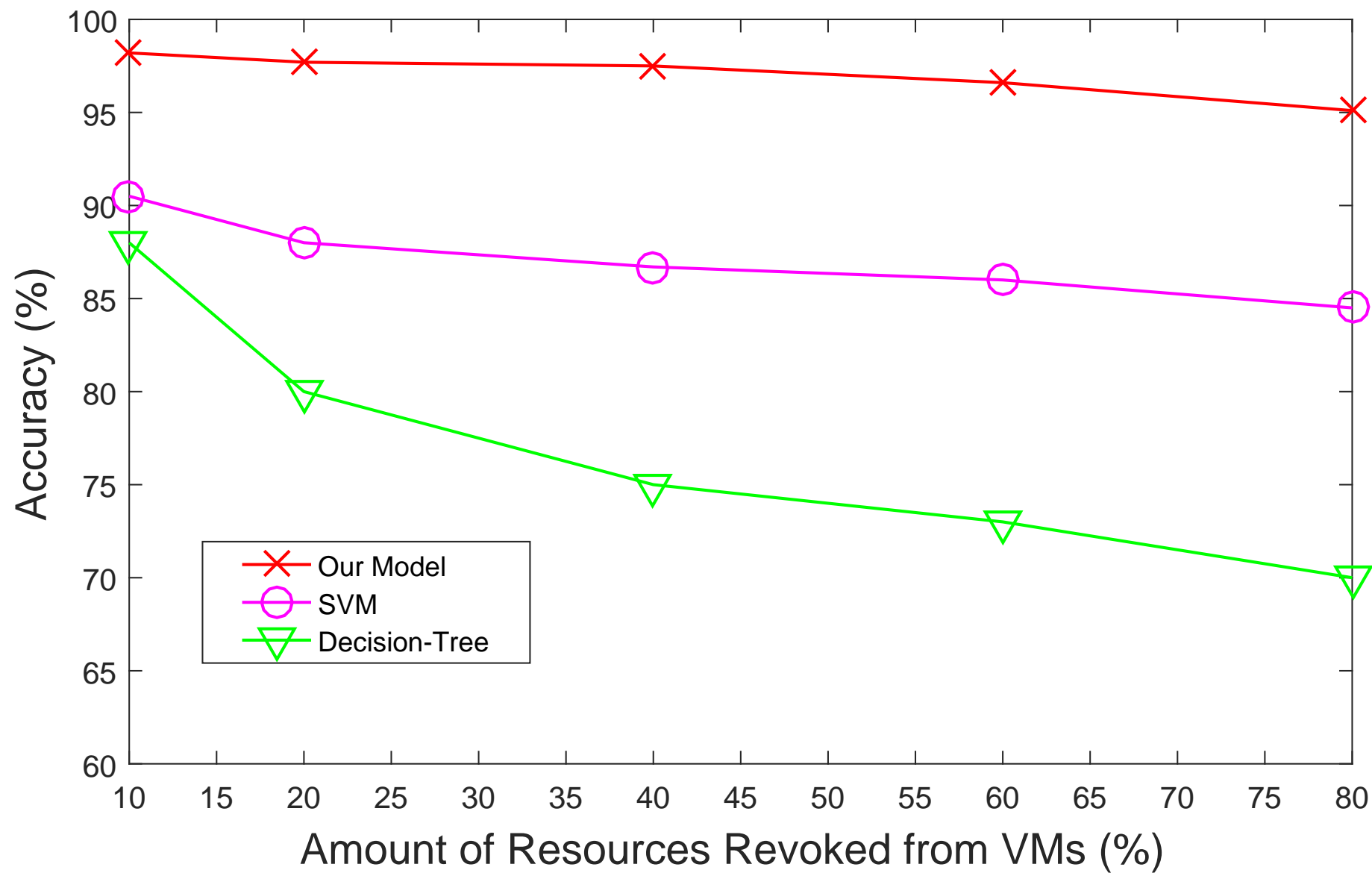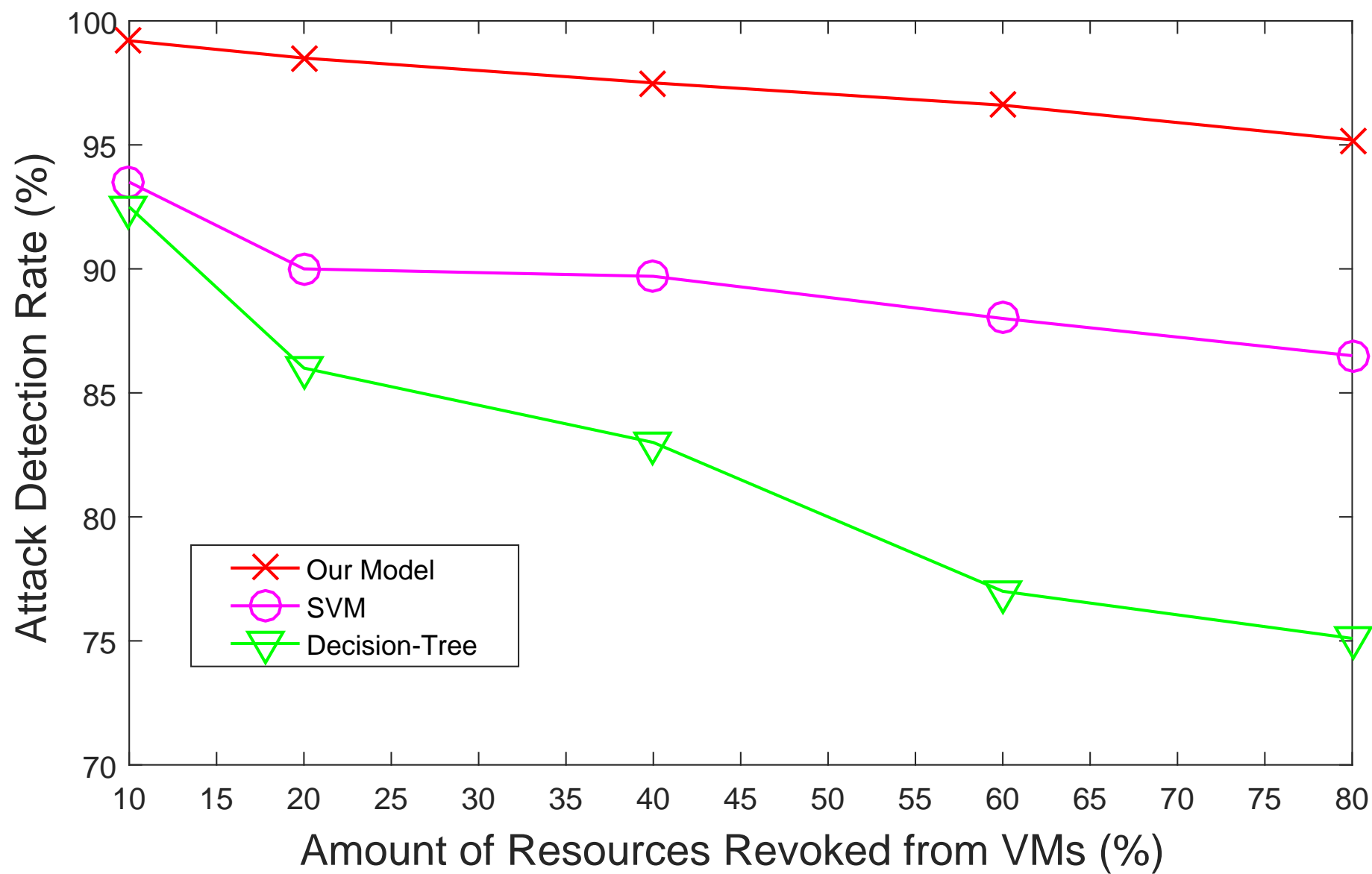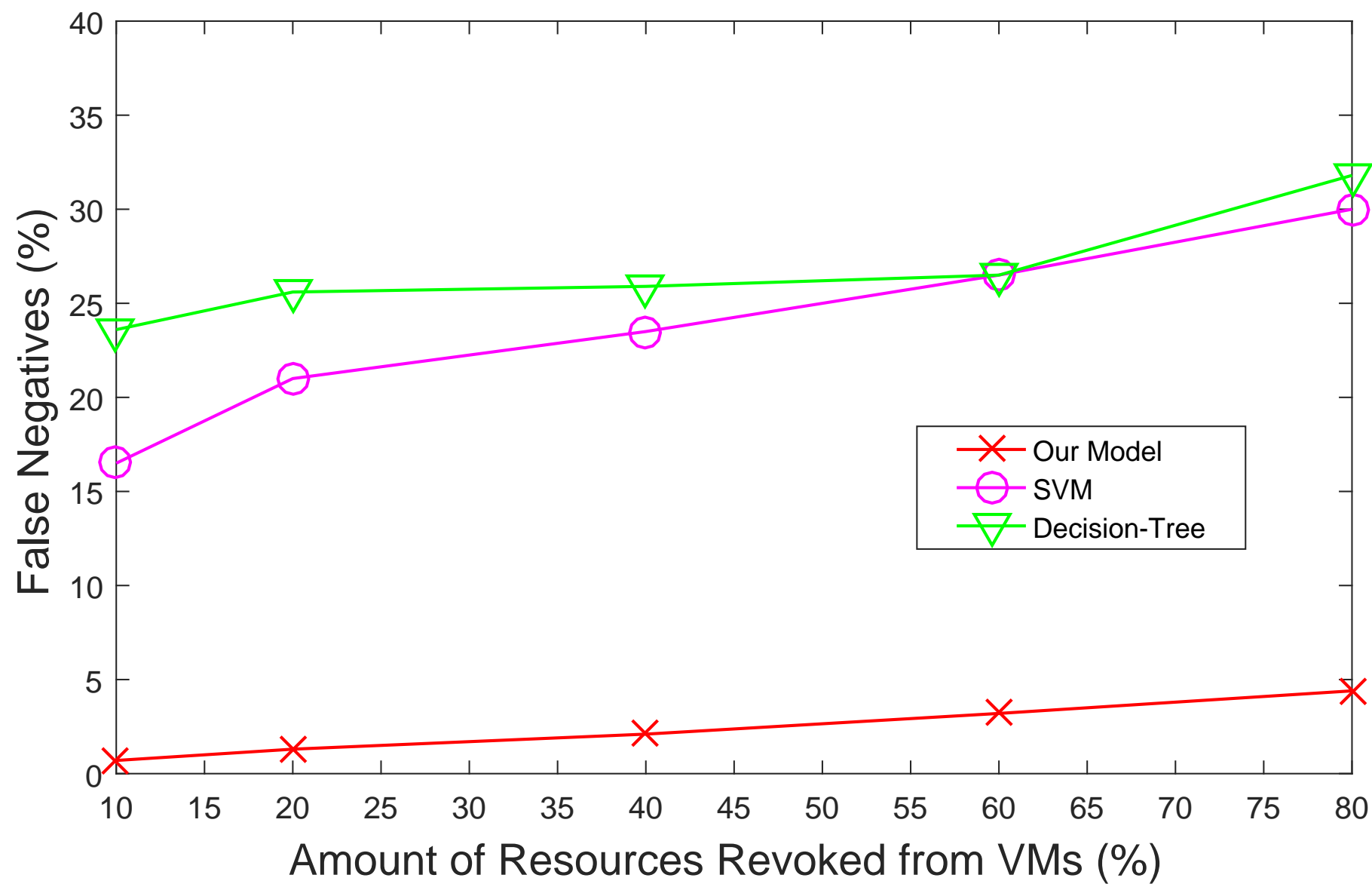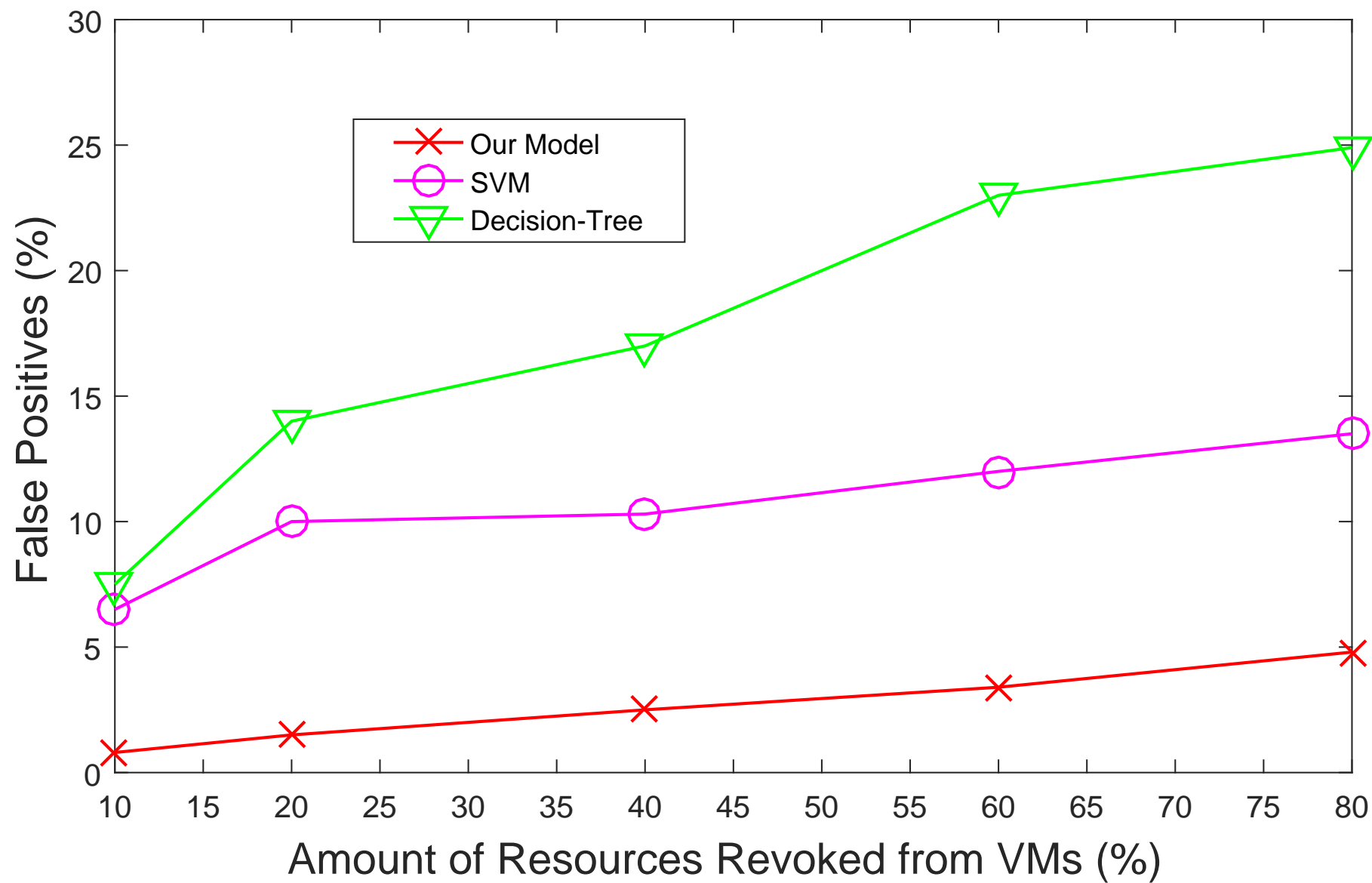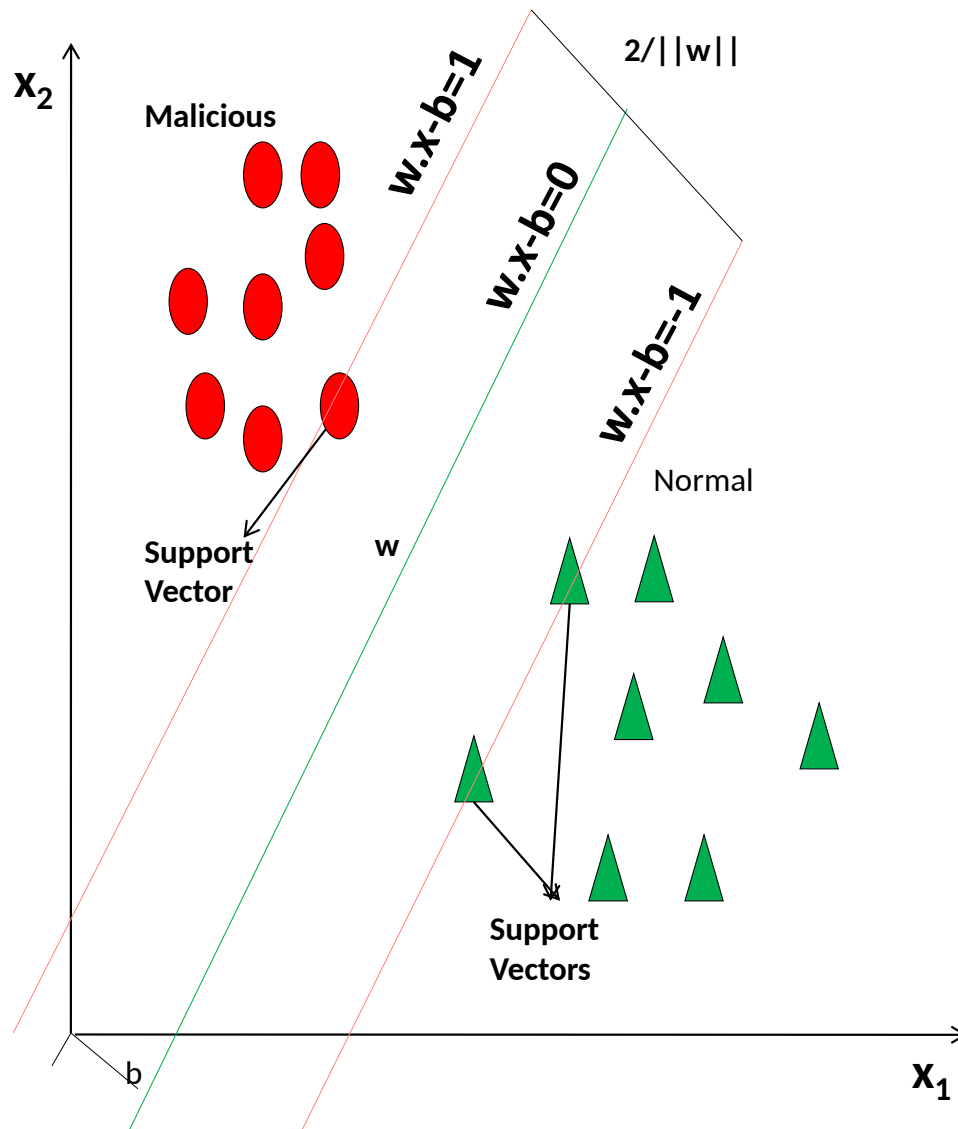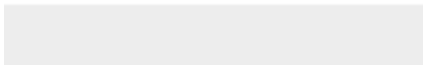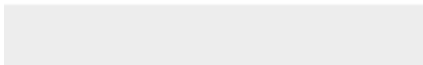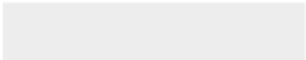
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Supplementary Material

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