Errata for "SDN-VSA: Modeling and Analysis of SDN Control Applications using Vector Spaces"

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Abstract

This document presents and explains the errata in our paper entitled: "SDN-VSA: Modeling and Analysis of SDN Control Applications using Vector Spaces" (`https://ieeexplore.ieee.org/document/8422959/`). The paper was published in the IEEE International Conference on Communications (ICC 2018). This errata document also applies to an older version (page numbers might differ) that is posted on arXiv entitled: "Modeling and Analysis of SDN Control Applications using Vector Spaces" (`https://arxiv.org/abs/1710.05252`).

1 Introduction

There is an erratum in Equation (1) of Section IV "The SDN-VSA Framework" of the paper. There are also two errata in Section VI "SDN Service Chaining Use-Case" of the paper. In particular, the errata are in Equations (27) and (32). Based on the corrections we no longer call the transformations "affine". Finally, we added an addendum to clarify the network information base matrix of the use-case.

2 The Errata

2.1 Erratum 1

Location

Page:	3
Section:	IV "The SDN-VSA Framework"
Equation:	(1)

Explanation

In Equation (1), the last row in the composite transformation matrix and the network information base matrices should be removed, as in this paper we did not provide a definition for vector "1" in the Table-space.

Erratum

$$\begin{bmatrix} t_1^{'} \\ t_2^{'} \\ \vdots \\ t_{n-1}^{'} \\ 1 \end{bmatrix} = \begin{bmatrix} c_{1,1} & c_{1,2} & \cdots & c_{1,n} \\ c_{2,1} & c_{2,2} & \cdots & c_{2,n} \\ \vdots & \vdots & \ddots & \vdots \\ c_{n-1,1} & c_{n-1,2} & \cdots & c_{n-1,n} \\ 0 & 0 & \cdots & 1 \end{bmatrix} \times \begin{bmatrix} t_1 \\ t_2 \\ \vdots \\ t_{n-1} \\ 1 \end{bmatrix} \tag{1}$$

Correction

$$\begin{bmatrix} t_1^{'} \\ t_2^{'} \\ \vdots \\ t_n^{'} \end{bmatrix} = \begin{bmatrix} c_{1,1} & c_{1,2} & \cdots & c_{1,n} \\ c_{2,1} & c_{2,2} & \cdots & c_{2,n} \\ \vdots & \vdots & \ddots & \vdots \\ c_{n,1} & c_{n,2} & \cdots & c_{n,n} \end{bmatrix} \times \begin{bmatrix} t_1 \\ t_2 \\ \vdots \\ t_n \end{bmatrix} \tag{1}$$

2.2 Erratum 2

Location

Page:	5
Section:	VI "SDN Service Chaining Use-Case"
Equation:	(27)

Explanation

In Equation (27), $\mathcal{X}_{IDS}$ and $\mathcal{X}_{LB}$ are vectors and should not be in the composite transformation matrix, instead they should be in the network information base matrix.

Erratum

$$\mathcal{X}_{IDS \rightarrow LB} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & \mathcal{X}_{IDS} \\ 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & \mathcal{X}_{LB} \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & \mathcal{X}_{LB} \\ 0 & 1 & \mathcal{X}_{IDS} \\ 0 & 0 & 1 \end{bmatrix} \tag{27}$$

Correction

$$\mathcal{X}_{IDS\rightarrow LB} = \begin{bmatrix} 1 & 0 & \mathbf{1} & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & \mathbf{1} & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} =$$
$$\begin{bmatrix} 1 & 0 & \mathbf{1} & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & \mathbf{1} & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \tag{27}$$

2.3 Erratum 3

Location

Page:	6
Section:	VI "SDN Service Chaining Use-Case"
Equation:	(32)

Explanation

In Equation (32), ${\mathcal{Y}'}_{LB}$, ${\mathcal{Y}'}_{IDS}$, ${\mathcal{Y}''}_{LB}$, and ${\mathcal{Y}''}_{IDS}$ are vectors and should not be in the composite transformation matrix, instead they should be in the network information base matrix.

Erratum

$$\mathcal{Y}_{LB\rightarrow IDS} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & {\mathcal{Y}''}_{LB} \\ 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & {\mathcal{Y}''}_{IDS} \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \times$$
$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & {\mathcal{Y}'}_{LB} \\ 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & {\mathcal{Y}'}_{IDS} \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} =$$
$$\begin{bmatrix} 1 & 0 & {\mathcal{Y}'}_{IDS} + {\mathcal{Y}''}_{IDS} \\ 0 & 1 & {\mathcal{Y}'}_{LB} + {\mathcal{Y}''}_{LB} \\ 0 & 0 & 1 \end{bmatrix} \tag{32}$$

Correction

$$\mathcal{Y}_{LB\rightarrow IDS} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & \mathbf{1} \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & \mathbf{1} & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \times$$

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & \mathbf{1} & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & 0 & 0 & \mathbf{1} & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} =$$

$$\begin{bmatrix} 1 & 0 & 0 & 0 & \mathbf{1} & 0 & \mathbf{1} & 0 \\ 0 & 1 & 0 & 0 & 0 & \mathbf{1} & 0 & \mathbf{1} \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \tag{32}$$

3 Addendum

The network information base matrix for the use-case presented in Section VI in Page 5 of the paper should be:

$$\begin{bmatrix} T_1 \\ T_2 \\ - \; - \; - \; - \\ \mathcal{X}_{IDS} \\ \mathcal{X}_{LB} \\ \mathcal{Y}^{'}_{IDS} \\ \mathcal{Y}^{'}_{LB} \\ \mathcal{Y}^{''}_{IDS} \\ \mathcal{Y}^{''}_{LB} \end{bmatrix}$$