Image Forgery Detection Based On Sets of 9 Dimensional Convex Equations

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Abstract: Image forgery creation is analyzed from 9 dimensional convex equation analysis

Keywords: 9 dimensions, convex equation

1. INTRODUCTION

Image forgery is created based on 9 dimensional convex equations and their analysis.

2. EQUATIONS AND THEIR ANALYSIS

A 18 dimensional plane is considered. Bases are taken for each of the dimensions as [1 0 0 0 … 0], [0 1 0 0 … 0], [0 0 1 0 0 … 0] … [0 0 0 … 1]. Equations are considered by clubbing two bases in terms of a parabola with the ends symmetric to origin. Likewise 9 such combinations are considered to acheive 9 such convex shapes centered at origin.

Equation of 1st convex shape

$Y1 = a1[1\ 0\ 0\ 0 … 0] + b1[0\ 1\ 0\ 0\ 0 … 0]$ where a1 and b1 are vectors.

$Y2 = a2[0\ 0\ 1\ 0\ 0\ 0 … 0] + b2[0\ 0\ 0\ 1\ 0\ 0\ 0 … 0]$ where a2 and b2 are vectors.

$Y3 = a3[0\ 0\ 0\ 0\ 1\ 0\ 0\ 0 … 0] + b3[0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0 … 0]$ where a3 and b3 are vectors.

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$Y9 = a9[0\ 0\ 0 … 1\ 0] + b9[0\ 0\ 0 … 0\ 1]$ where a9 and b9 are vectors.
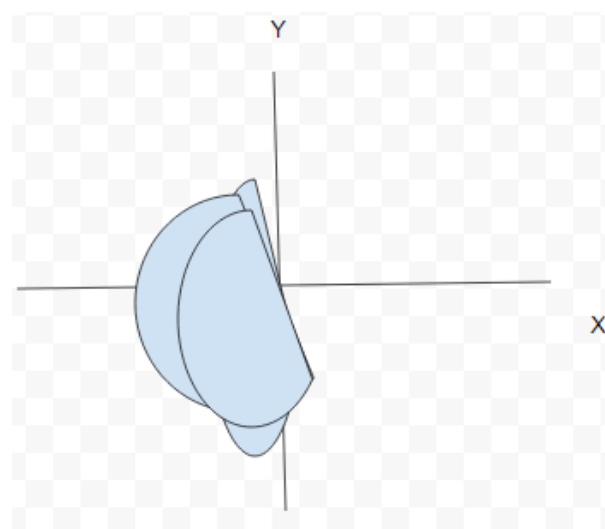

Fig. 1 Y1, Y2 and Y3

3. CREATION OF FORGED IMAGE

3.1 Projection of considered image

The image equation is calculated based on backpropagation neural network's weight vectors as seen in reference [2].
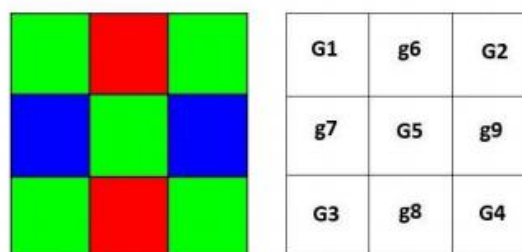

Fig. 2 Calculation of image equation(a)

From Fig 2 [G1 G2 G3 G4 G5] are given as input and [g6 g7 g8 g9] are given as output in Fig 3.
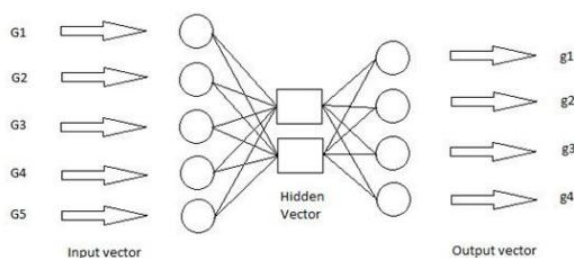
Fig. 3 Calculation of image equation(b)

The neural networks are trained as seen above and the average of all weights stacked together forms the image equation. Average of all neural network weights is taken as the equation of the image considered. This equation is projected on the 9 different convex shapes considered above i.e. Y1 Y2 Y3 … Y9.

3.2   Detection of forged image

Equations whose null spaces of projections on the 9 convex shapes are taken. If there is an intersection of this equation with that of the image equation the image is not forged.

Equations whose null spaces of projections on the 9 convex shapes are taken. If there is an intersection of this equation with that of the image equation the image is not forged. This analysis is repeated for all the null spaces arrived for at the convex equational base. This is extended to one more dimension to seek whether the image is forged.

Projections are taken from this equation onto the convex shapes on these convex equations to create a forged image.

4.   ACKNOWLEDGMENTS

5.   REFERENCES

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