IMAGE COMPRESSION ALGORITHMS FOR PROCESS OPTIMIZATION IN LIVESTOCK FARMING PRECISION

UNIVERSIDAD EAFIT®

Team Presentation

Stefanny Escobar Ramírez

Sara Gallego

David González

Simón Marín

Mauricio Toro

https://github.com/StefannyEscobar/FarmingProject.git

UNIVERSIDAD EAFIT

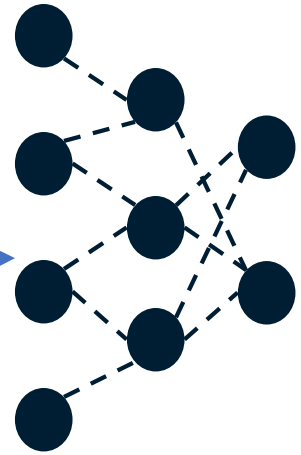
Training Process

Sick-Cattle Images

Healthy-Cattle Images

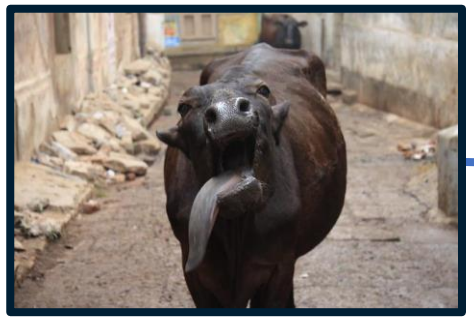
Convolutional Neural Network

Classification Algorithm



Classification Model

UNIVERSIDAD EAFIT



Cattle Image

Compressed image

SVD/Huffman coding

Classification Model

Is sick

Output

Compression Algorithm Design: Singular Value Descomposition

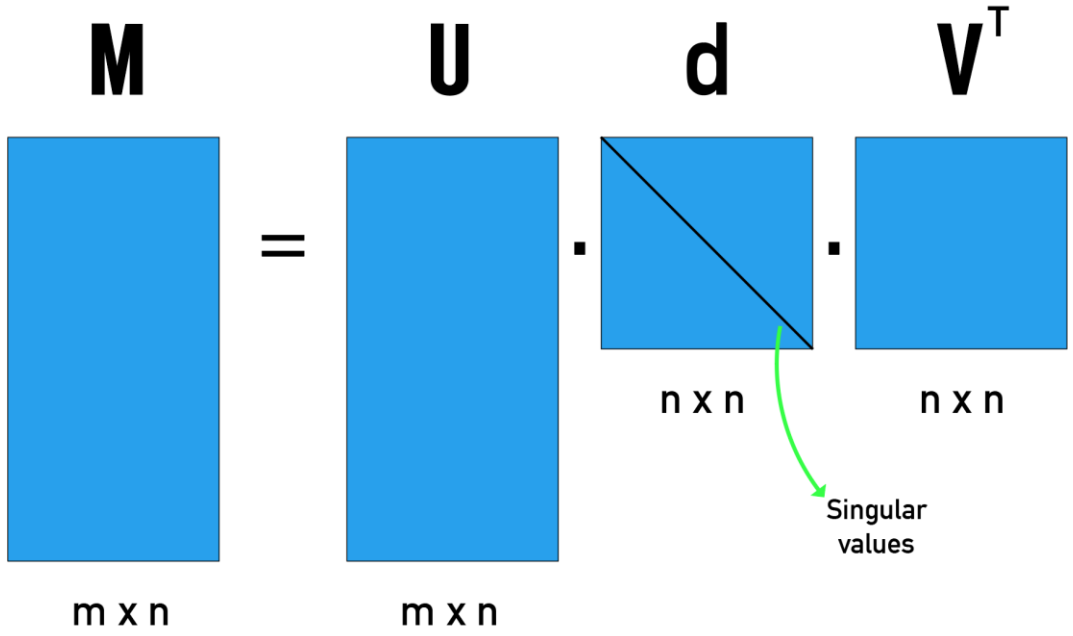
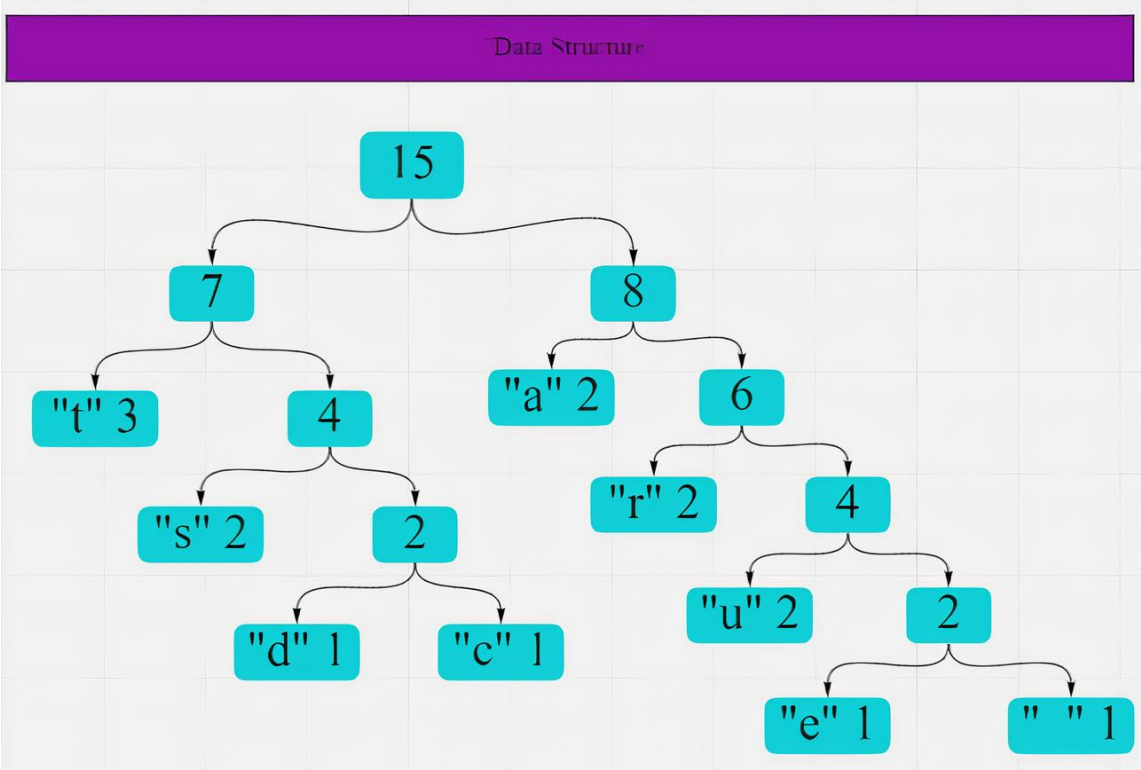


Photo by Wolfgang Hasselmann on Unsplash

Compression Algorithm Design: Huffman Coding



The binary tree is a data structure which is composed of root, branch and leaf, in which each node can have one left and one right child.

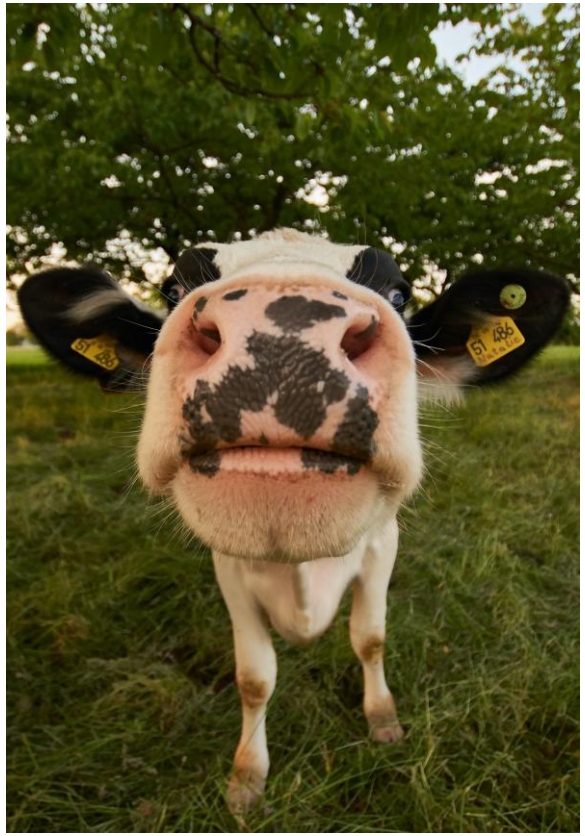


Photo by Wolfgang Hasselmann on Unsplash

Compression Algorithm Design: Huffman Coding

Huffman Tree from the string “Data Structure”

Character	d	a	t	s	r
Frequency	1	2	3	2	2

Character	u	c	e	" "	Total
Frequency	2	1	1	1	15

Photo by Doruk Yemenici on Unsplash

Huffman coding is implemented by constructing a binary tree of nodes from a list of nodes, whose size depends on the number of symbols n. The nodes contain two fields, the symbol and the weight.

Compression Algorithm Complexity

SVD	Time Complexity
Image compression	O(N)
Image decompression	O(N)

Time complexity of the SVD algorithm. N is the width of the matrix and M represents the length of the image matrix.

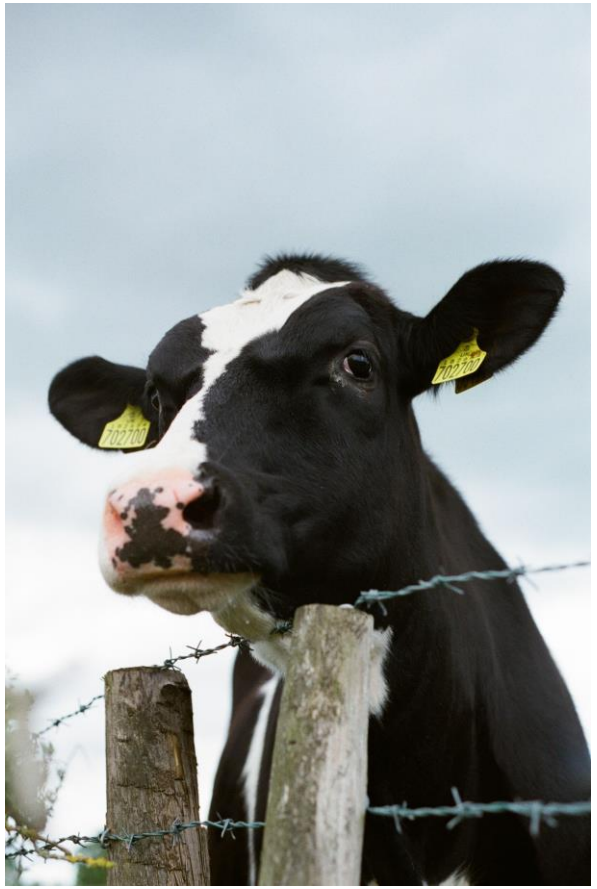


Photo by Jakob Cotton on Unsplash

Compression Algorithm Complexity

Huffman	Time Complexity	Time	
Image compression	O(N*M)	0.7333s	
Image decompression	O(N)	0.574s	

Time complexity of the Huffman algorithm. N is the width of the matrix and M represents the length of the image matrix.

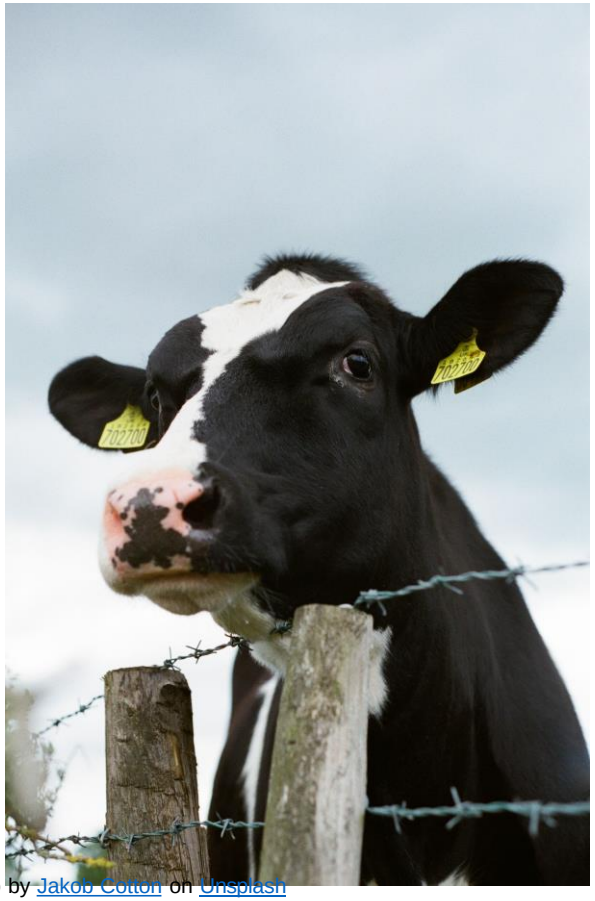
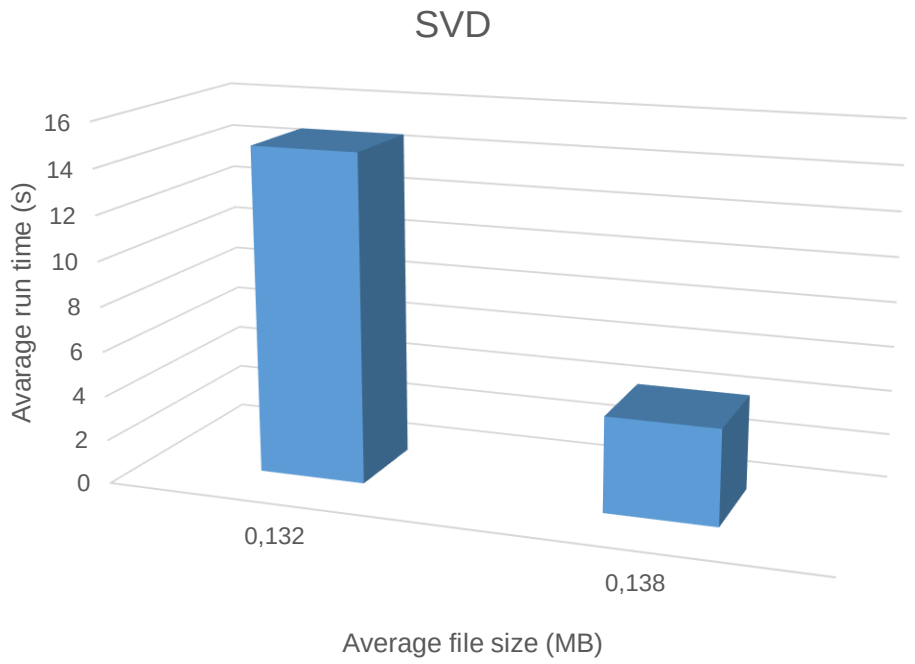
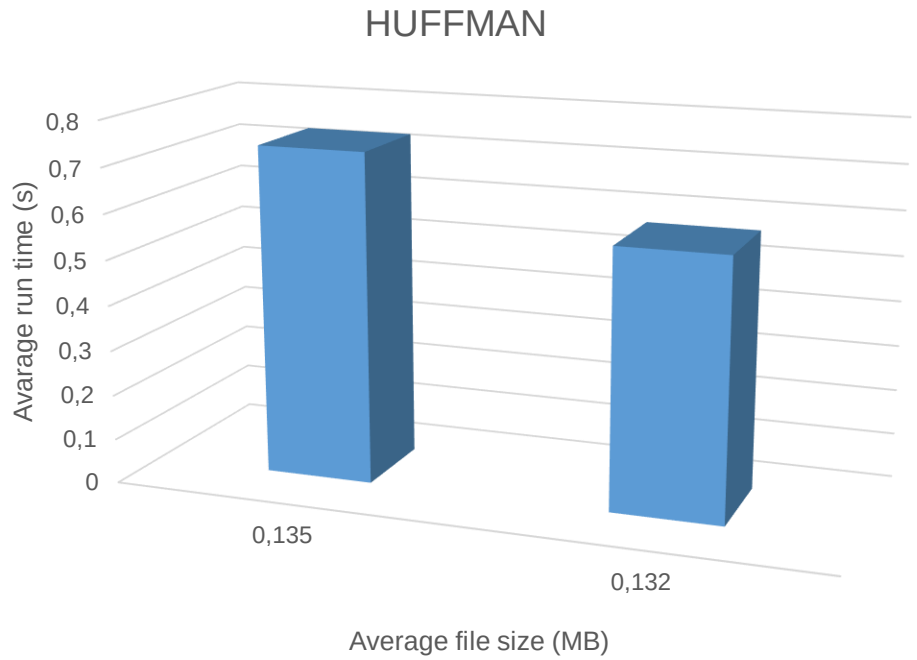


Photo by Jakob Cotton on Unsplash

Time Consumption



Time Consumption



Time Consumption

Average Compression Ratio

	Compression Ratio
Healthy Cattle	2 : 1
Sick Cattle	2 : 1

Here we represent the rounded Average Compression Ratio of all the images of Healthy Cattle and Sick Cattle that were took into account in the project.

Thanks!

Supported by

Two of the authors are supported by a Sapiencia, grant funded by the municipality of Medellín. The other author is supported by Generation E, we give a big thank you to both this foundations as this development would have not been possible without their help and contribution. All authors would like to thank the Vicerrectoría de Descubrimiento y Creación, Universidad EAFIT, for their support in this research and development. This work is what it is today thanks to perseverance and constant interest.