HEALTH DETECTION ON CATTLE COMPRESSED IMAGES IN PRECISION LIVESTOCK FARMING

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Team Presentation

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https://github.com/Sebastian-Tapias/ST0245-001/tree/master/proyecto

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Problem

The problem we are facing is the number of images and the energy consumption it takes to transmit data in the farm to devices or cloud to get process.

https://github.com/Sebastian-Tapias/ST0245-001/tree/master/proyecto

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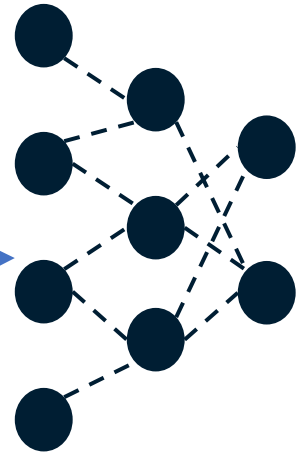
Training Process

Sick-Cattle Images

Healthy-Cattle Images

Convolutional Neural Network

Classification Algorithm



Classification Model

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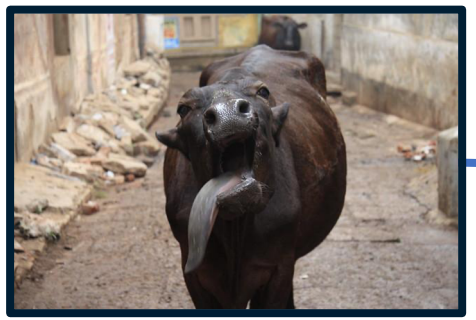
Testing Process



Cattle Image

SEAM CARVING & LZW

Compression algorithm

Classification Model

Is sick

Output

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Lossy-Compression Algorithm Design

Seam Carving algorithm, used in image compression for the automatic classification of animal health.

The white line represents next the path of pixels with the lowest energy to be erased.

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Lossless Compression Algorithm Design

The LZW algorithm creates a dictionary where patterns are storaged.

Patterns and element are keys of the dictionary and values are indexes used for decompression.

	Compressed Output	Dictionary	Buffer	Uncompressed Input
a)			0	100110101
b)	0	2(0,1)	0	100110101
c)	01	3(1,0)	1	00110101
d)	010	4(0,0)	0	0110101
e)	010		0	110101
f)	0102	5(0,1,1)	2	10101
g)	0102		1	0101
h)	01023	6(1,0,1)	3	101
i)	01023		1	01
j)	01023		3	1
k)	010236		6	

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Compression Algorithm Complexity

	Time Complexity	Memory Complexity
Image compression	$O(N^3*M^3)$	$O(N^3*M^3)$
Image decompression	$O(N^2)$	$O(N^2)$

Time and memory complexity of the Seam Carving & LZW algorithm. Where N are the rows and M are the columns of the NumPy array

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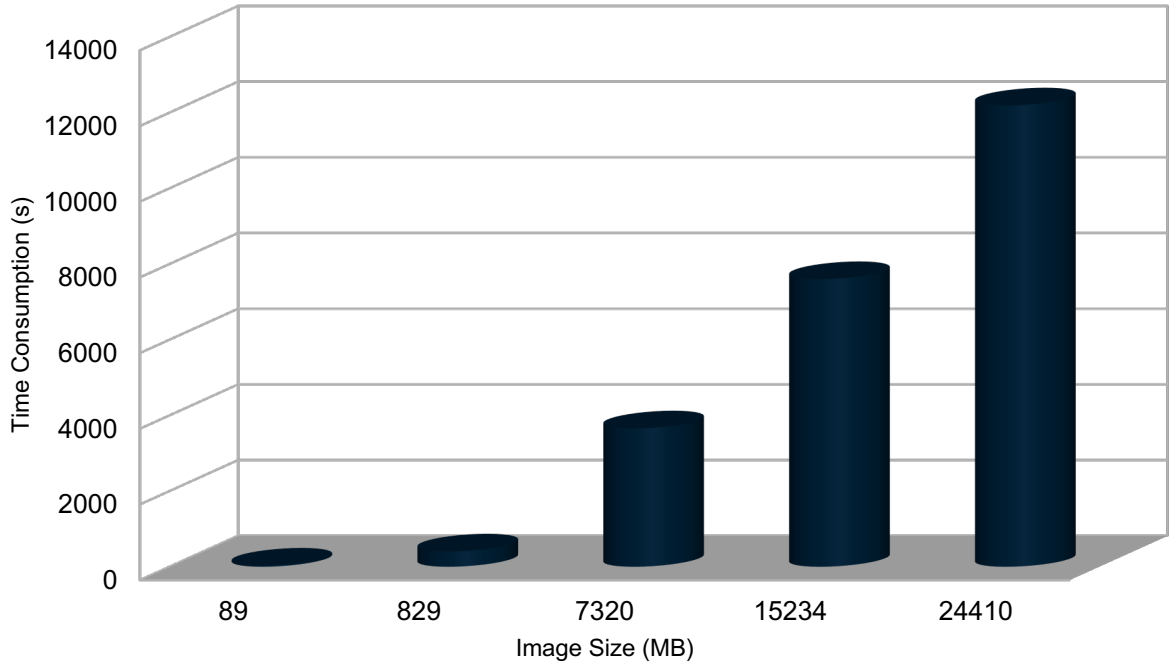
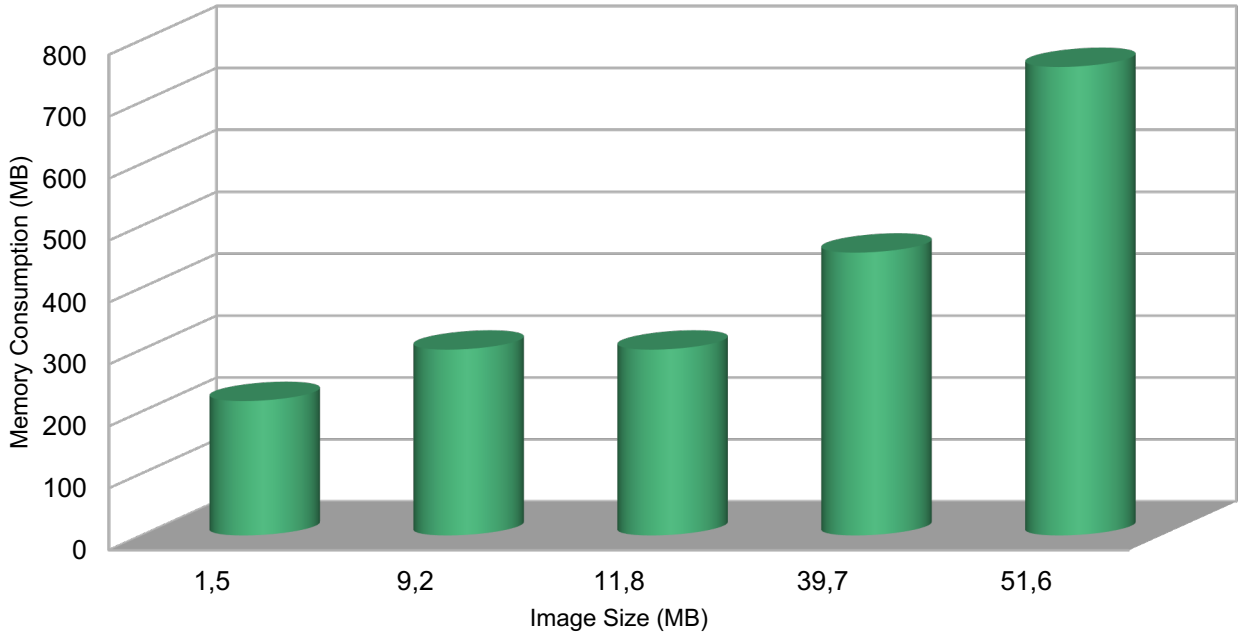
Time and Memory Consumption





Time Consumption

Memory Consumption

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Average Compression Ratio

	Compression Ratio
Healthy Cattle	1.82 : 1
Sick Cattle	1.64 : 1

Average compression ratio for Healthy Cattle and Sick Cattle. I.e a file of 1’000.000 MB will weigh 549.450 MB.

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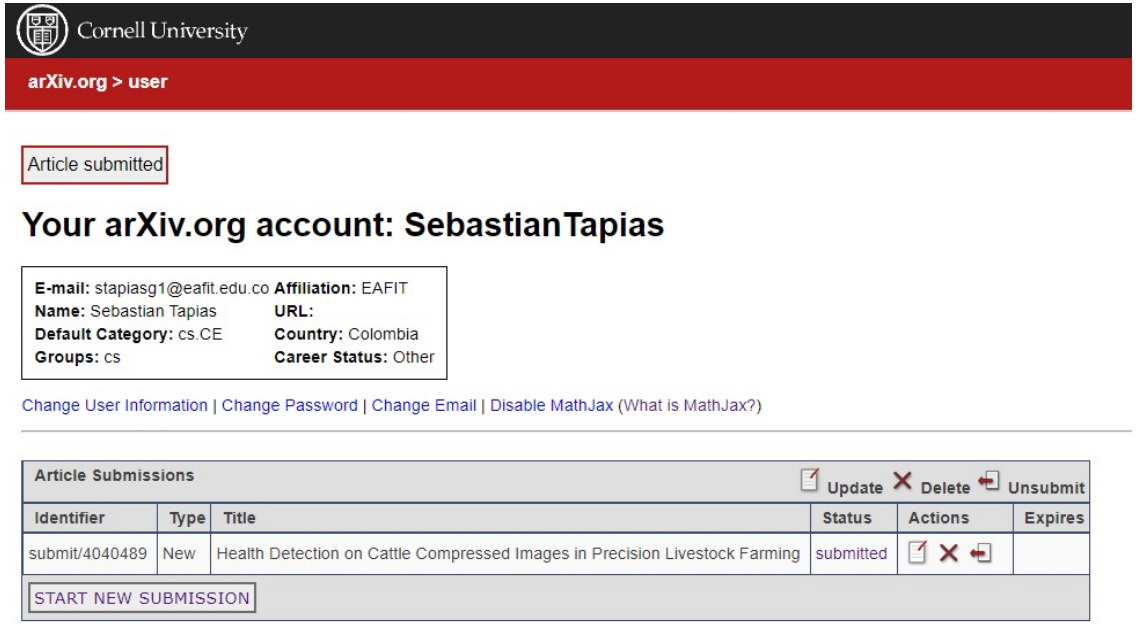
Report Accepted on arXiv

M. Calvache, V. Cardona, S. Tapias, S. Marin and M. Toro . Health detection on cattle compressed images in precision livestock farming. ArXiv e-prints, Nov. 2021. Available at:



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