

Recognition and reconstruction of wear maps using machine learnings

Brayan Valenzuela, Cristian Viáfara &
Fabio Martínez

Motion Analysis and Computer Vision
Biomedical Imaging, Vision and Learning Laboratory
Universidad Industrial de Santander
Bucaramanga - Colombia

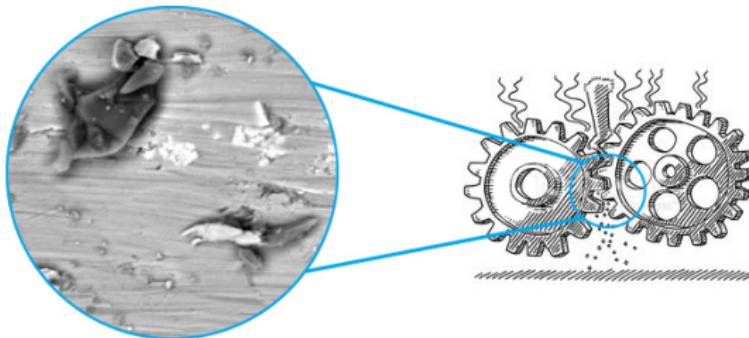


Contenido

- 1 Introduction
- 2 Data set
- 3 Proposed method
- 4 Evaluation and results
- 5 Questions

Introduction

Motivation

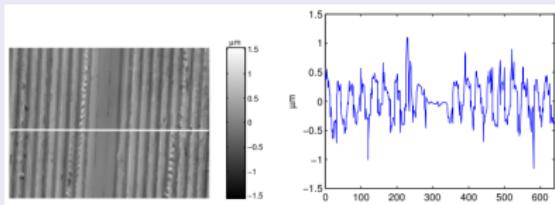


- One of the greatest causes of unavailability of machine components is wear.
- This wear occurs due to the interaction of surfaces generating loss of mass.
- All these losses have associated high costs due to the corresponding maintenance and reparation events.

Wear Analysis

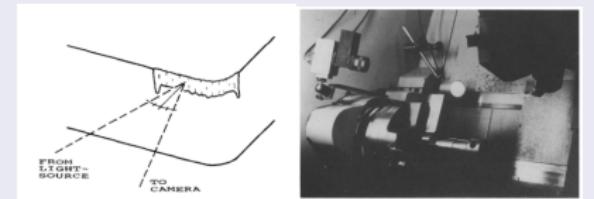
DETECTION AND MONITORING OF WEAR USING IMAGING METHODS(2006)

Wear monitoring based image processing under principles such as: filtering scheme, fractal analysis, etc.



WEAR MEASUREMENT OF CUTTING TOOLS BY COMPUTER VISION (1988)

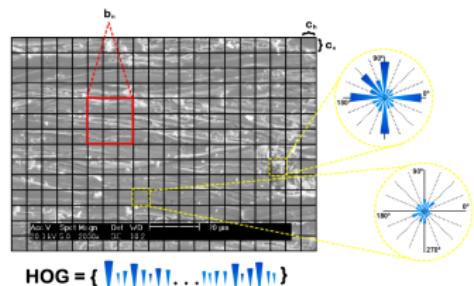
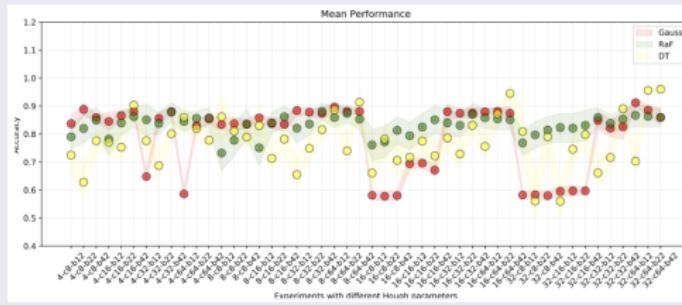
In this work a prototype based on computer vision is developed to achieve an adequate wear measurement.



Wear Analysis

WEAR MEASUREMENT OF CUTTING TOOLS BY COMPUTER VISION (2018)

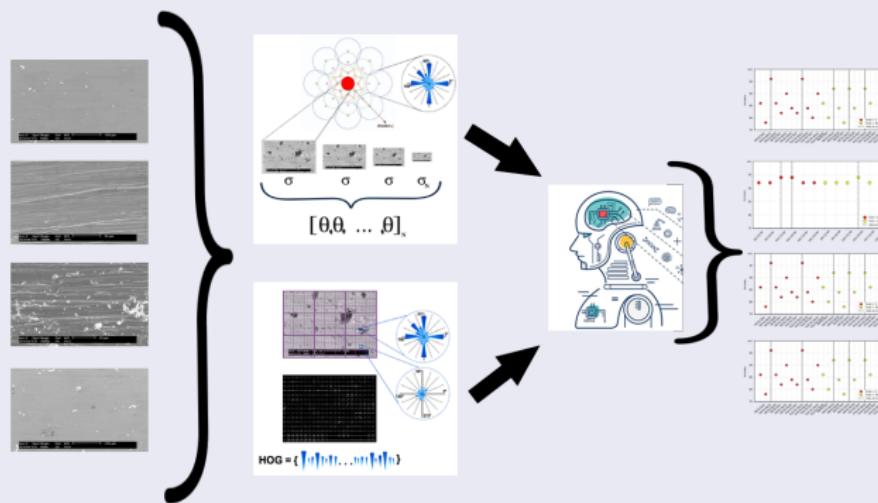
A computational strategy was proposed to classify mild and severe regimes by using a histogram of oriented gradients (HoG) to represent the surface features.



Wear Analysis

Analysis of worn surface images using gradient-based descriptors (2019)

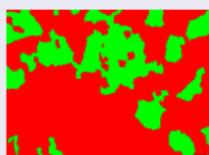
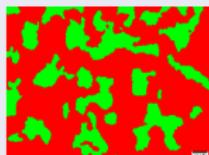
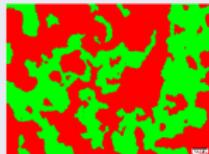
A computational strategy was proposed to classify mild and severe regimes by using a histogram of oriented gradients (HoG) and Deisy descriptor to represent and recognize the surface features.



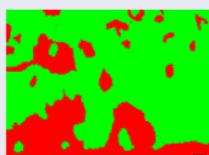
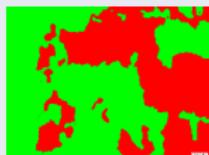
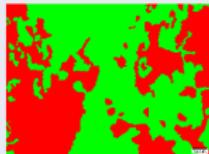
Data set

Data set

Training(9 images)

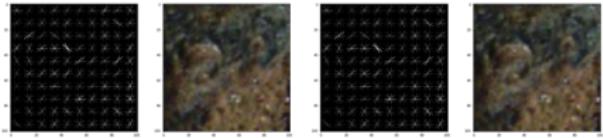
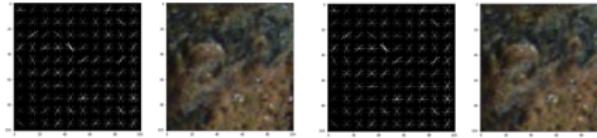
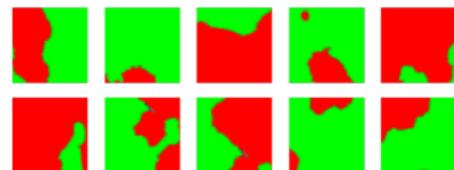
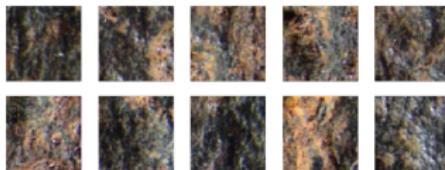
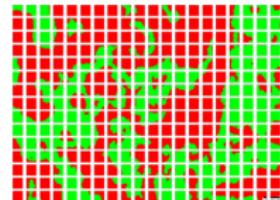
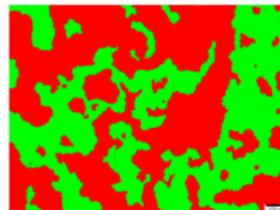


Test(3 images)

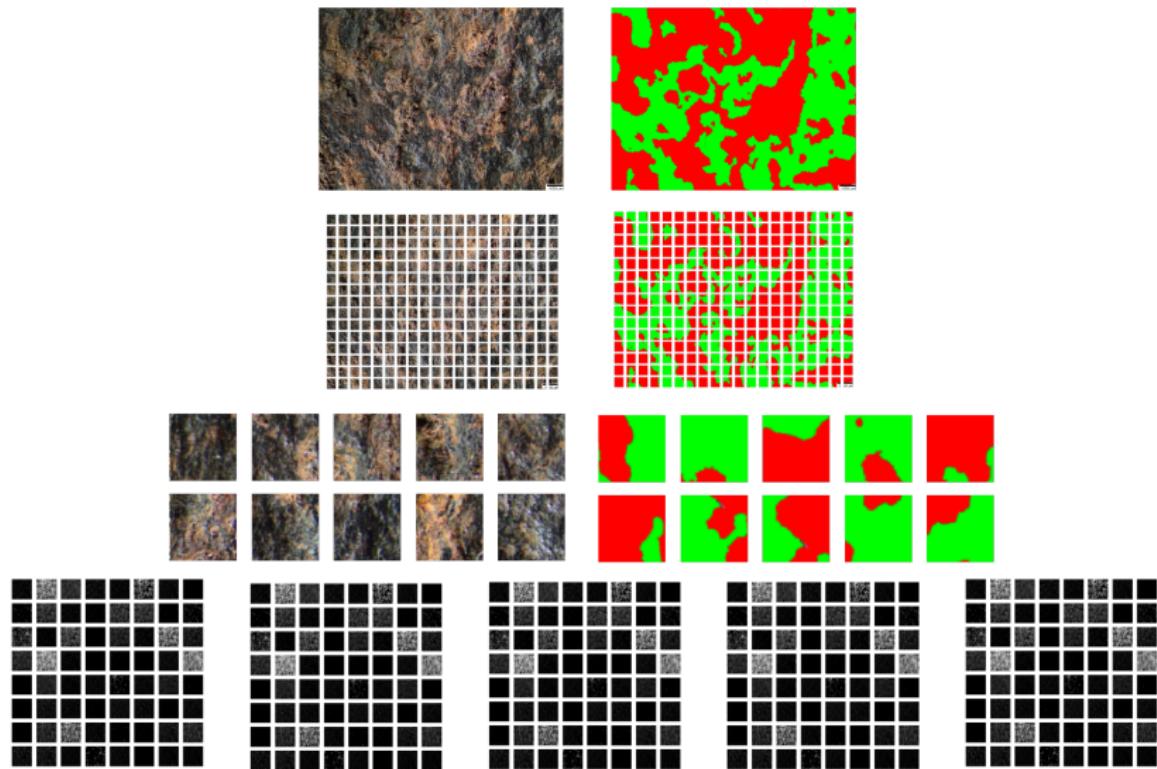


Proposed method

Bag of words

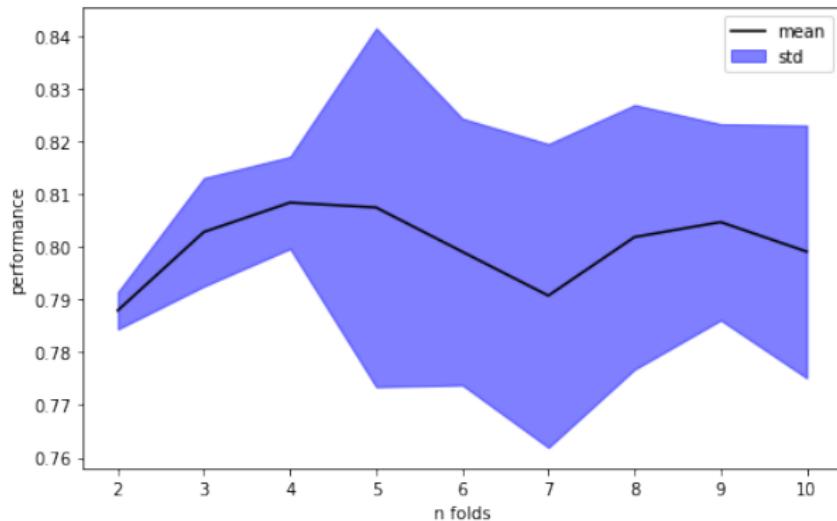


Deep features



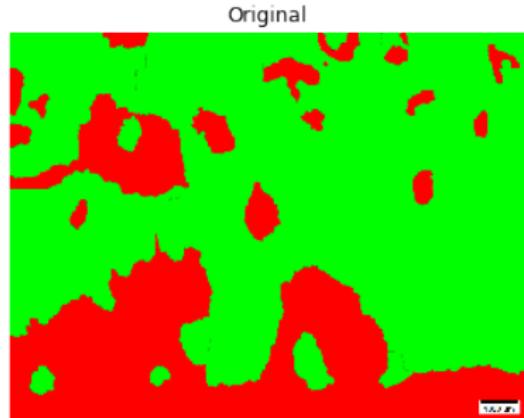
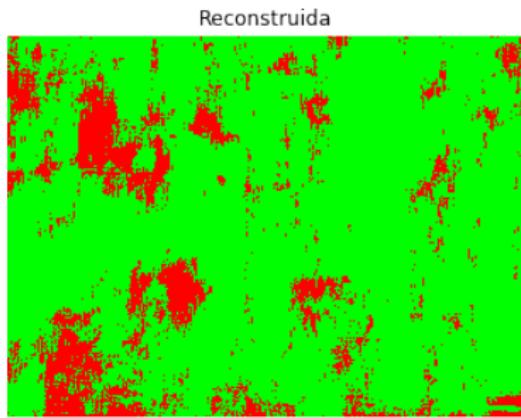
Evaluation and results

Evaluation whit bag of words



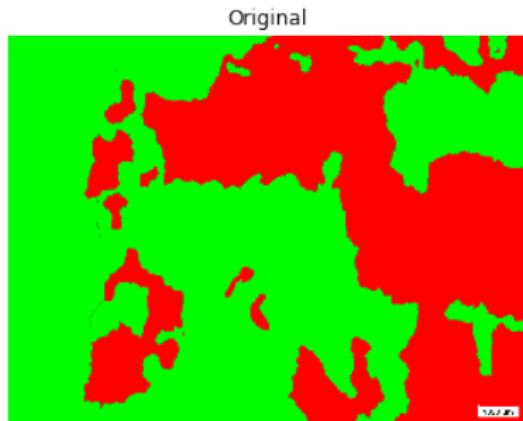
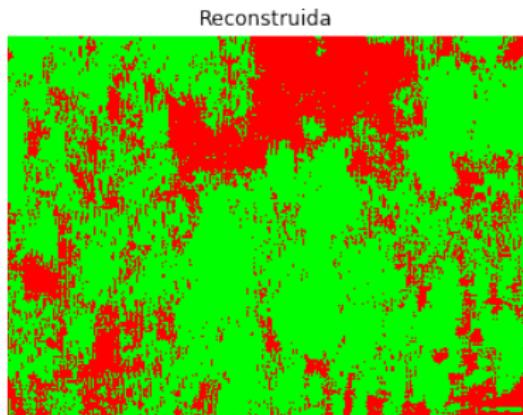
- Accuracy in the training phase: 81%.
- Accuracy in the test phase: 70%.

Reconstructions using bag of words



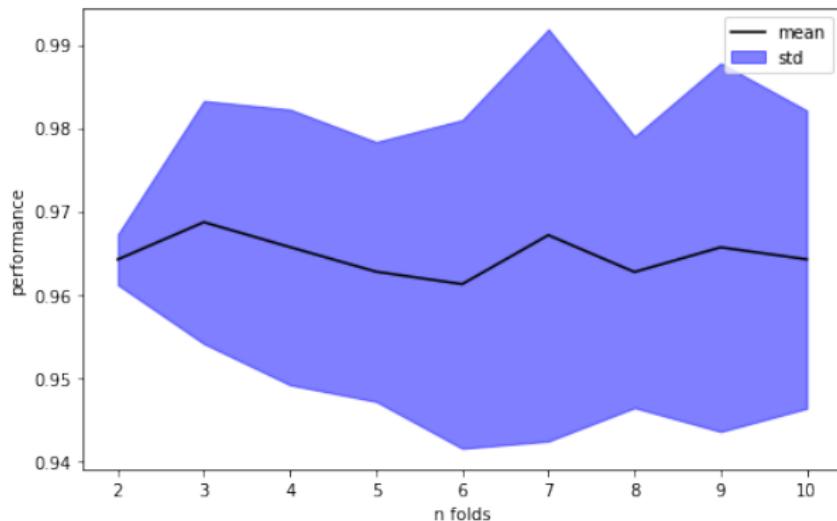
- little ability to capture entire regions of wear using a bag of words.

Reconstructions using bag of words



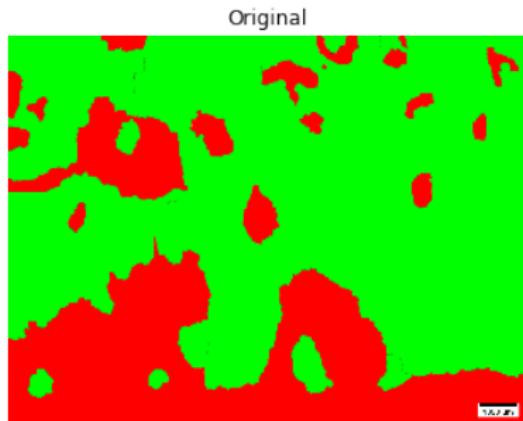
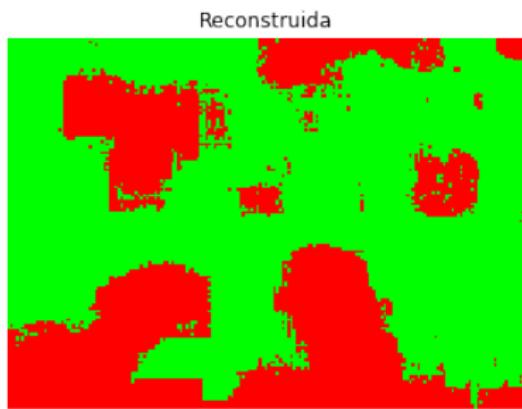
- The same problem.

Evaluation using deep features



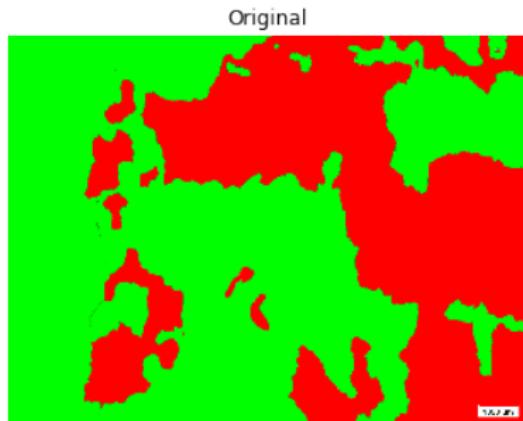
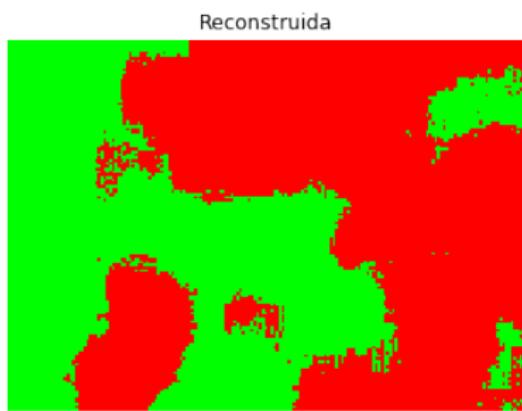
- Accuracy in the training phase: 97%.
- Accuracy in the test phase: 93%.

Reconstructions using deep features



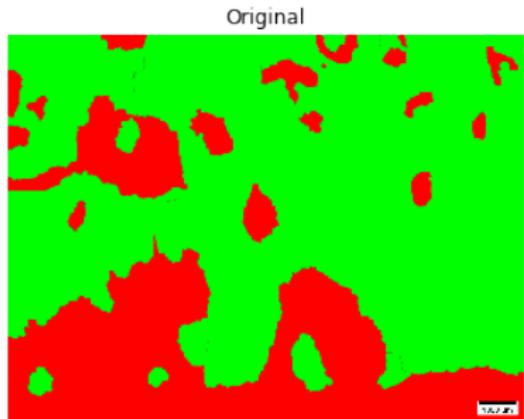
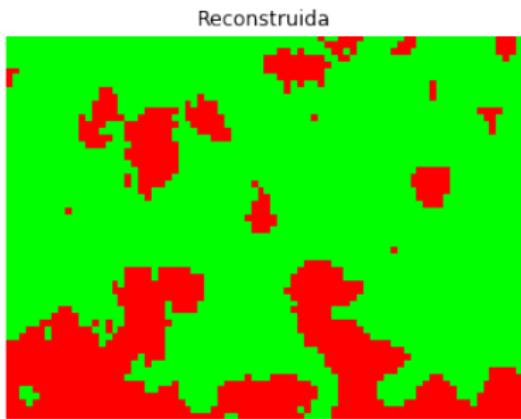
- Good ability to capture regions.

Reconstructions using deep features



- Good ability to capture regions.

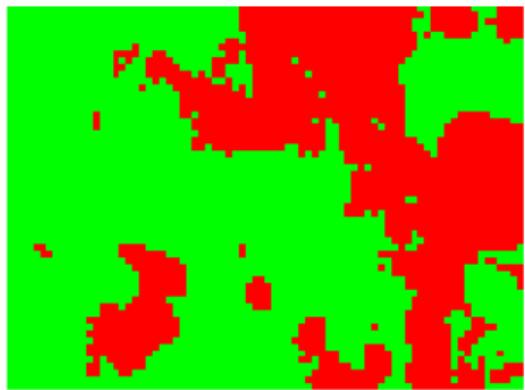
Reconstructions using deep features to 40%



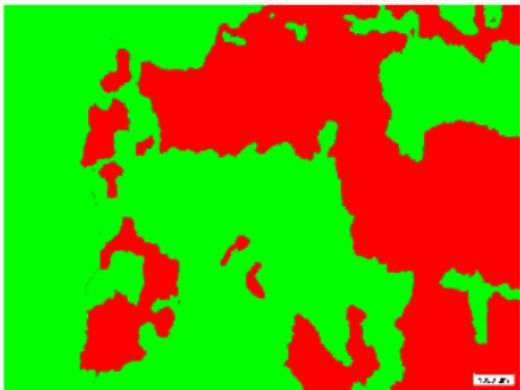
- Three minutes of reconstruction.

Reconstructions using deep features to 40%

Reconstruida



Original



Thank you for your attention!

Questions?



Github repository:

<https://github.com/Brayan-Valenzuela/Reconocimiento-y-reconstruccion-de-mapas-de-desgaste-usando-machine-learning.git>