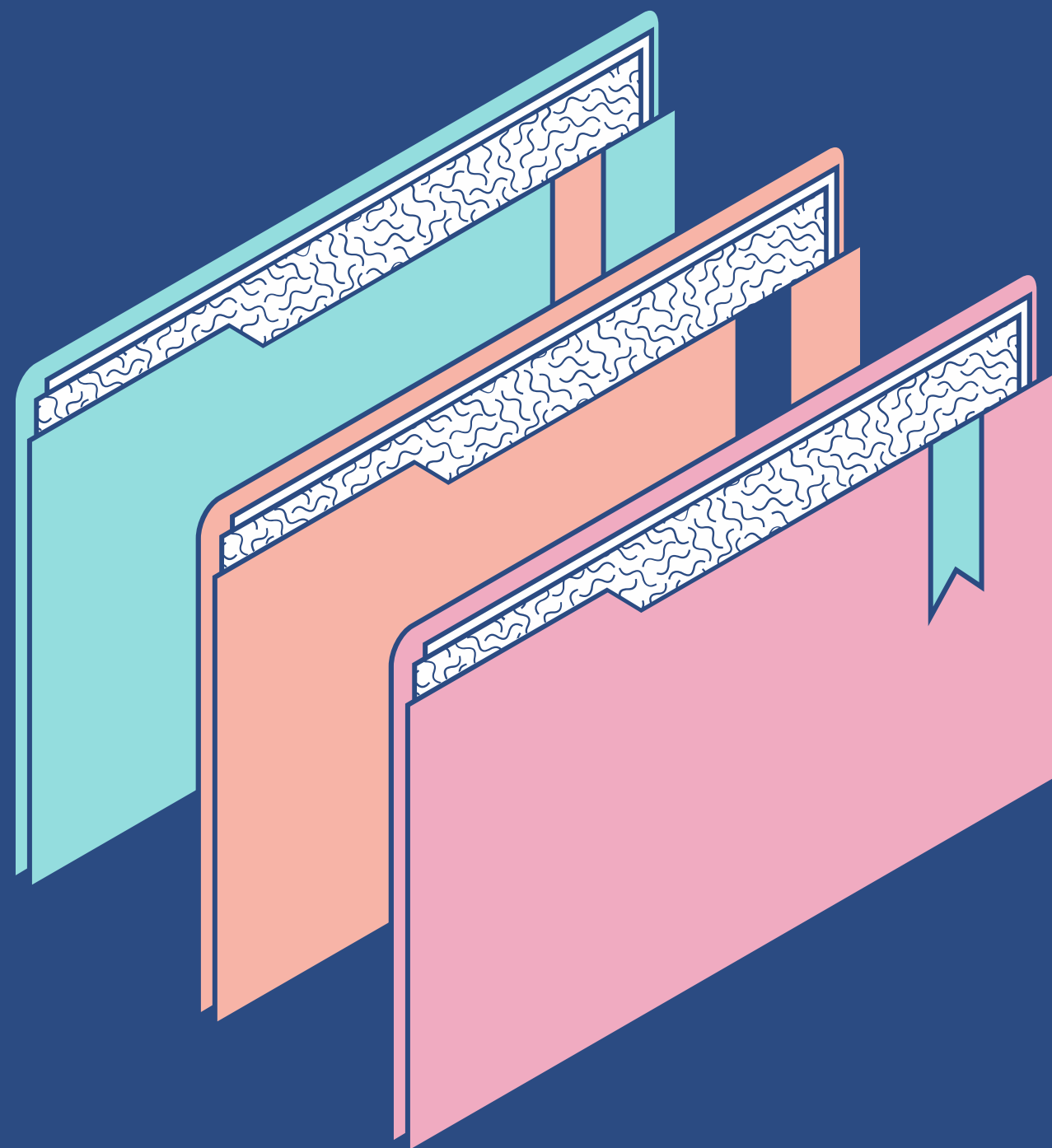


A stylized illustration of a desk setup. In the center is an open laptop with a teal screen and a dark keyboard. To the left of the laptop is a stack of three books in teal, orange, and white. Below the books is a potted plant with long, pointed leaves in teal and orange, sitting in an orange pot. To the right of the laptop is a teal pen holder with a pink base, containing three pens in orange, teal, and pink. Above the laptop is a teal folder or notebook with a white border and a pattern of small white crosses. In the bottom right corner, there is a white monitor or tablet displaying a pink screen and teal windows.

COMPUTER VISION

# Honey Bee Health Detection

Seminario profesional 1  
Iñigo Alvarado Guirola  
Karla Ximena Alvizures Rivera.





# Agenda

## TEMAS PRINCIPALES DE ESTA PRESENTACIÓN




- Objetivos
- Información relevante de las abejas
- Metodología
- Implementación
- Resultados
- Mejoras a futuro
- Conclusiones

# Competencia

 JENNY YANG · UPDATED 5 YEARS AGO


 256

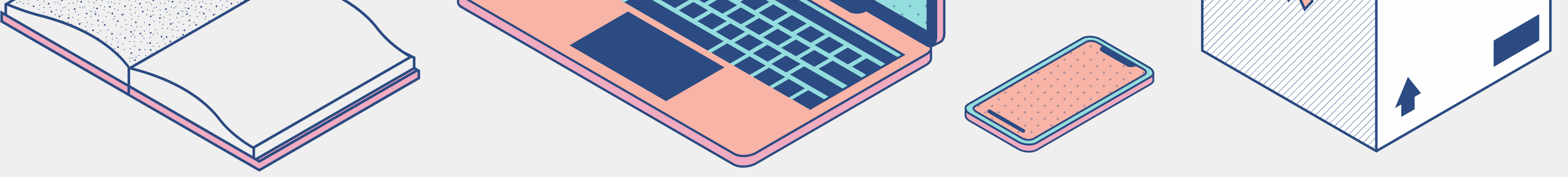
New Notebook

 Download (53 MB)  

## The BeelImage Dataset: Annotated Honey Bee Images

Apis mellifera with location, date, health, and more labels





# Objetivos

- 1. Comprender el desarrollo de la enfermedad que surgen en las colmenas de las abejas.
- 2. Identificar cuales son las abejas que están enfermas y las que no.
- 3. Evitar que suceda otras pérdidas de colmenas en el siguiente invierno.

# INFORMACIÓN RELEVANTE DE LAS ABEJAS

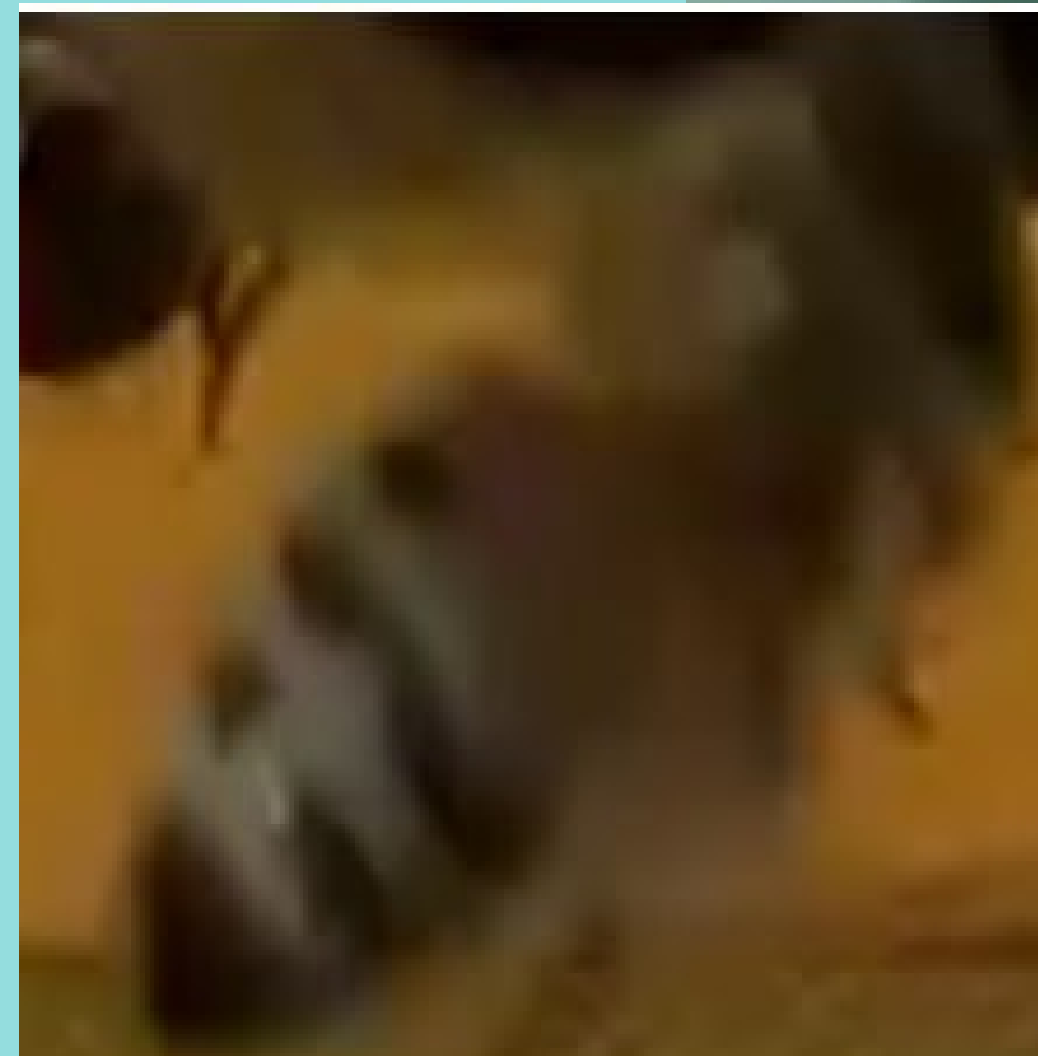
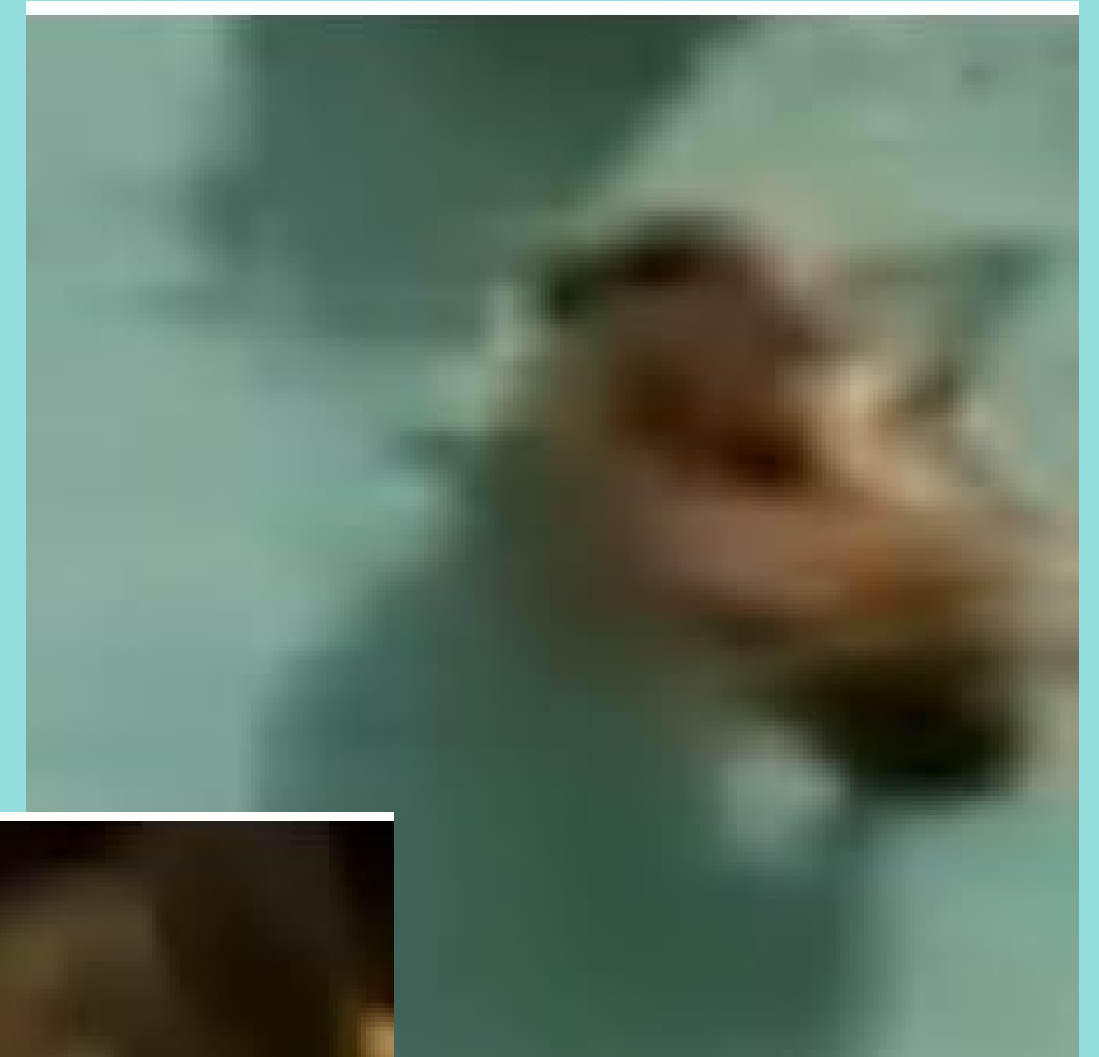
Las abejas son insectos sociales y colaboradores que viven en las colmenas formando grandes colonias, lo que ha proporcionado a las sociedades humanas miel y cera desde hace miles de años

# ESTACIONES DEL AÑO

VERANO  
PRIMAVERA  
INVIERNO  
OTOÑO



# ENFERMEDADES QUE PADECEN LAS ABEJAS





# CASOS QUE PODEMOS ENCONTRAR

**¿CÓMO AFECTA EL  
ÁCARO VARROA?**

- TRANSMITE VIRUS DIRECTAMENTE A LA HEMOLINFA DE LA ABEJA
- DEBILITA EL SISTEMA INMUNOLÓGICO DE LA ABEJA
- TRANSMITE ENFERMEDADES



**ABEJAS EN  
AGRICULTURA**



# METODOLOGIA

- Computer Vision
- Utilizando Redes Convolucionales
- Tipo de Clasificación: Binary Classification.



# IMPLEMENTACION

E

healthy



healthy



nonhealthy



```
[ ] raw_dataset = pd.read_csv("bee_data.csv", sep=",")
raw_dataset
```

	file	date	time	location	zip code	subspecies	health	pollen_carrying	caste
0	041_066.png	8/28/18	16:07	Alvin, TX, USA	77511	-1	hive being robbed	False	worker
1	041_072.png	8/28/18	16:07	Alvin, TX, USA	77511	-1	hive being robbed	False	worker
2	041_073.png	8/28/18	16:07	Alvin, TX, USA	77511	-1	hive being robbed	False	worker
3	041_067.png	8/28/18	16:07	Alvin, TX, USA	77511	-1	hive being robbed	False	worker
4	041_059.png	8/28/18	16:07	Alvin, TX, USA	77511	-1	hive being robbed	False	worker
...	...	...	...	...	...	...	...	...	...
5167	027_011.png	8/20/18	10:03	San Jose, CA, USA	95124	-1	healthy	True	worker
5168	027_007.png	8/20/18	10:03	San Jose, CA, USA	95124	-1	healthy	True	worker
5169	027_013.png	8/20/18	10:03	San Jose, CA, USA	95124	-1	healthy	False	worker
5170	027_012.png	8/20/18	10:03	San Jose, CA, USA	95124	-1	healthy	False	worker
5171	027_014.png	8/20/18	10:03	San Jose, CA, USA	95124	-1	healthy	False	worker

5172 rows × 9 columns

```
[ ] # Check all the unique values
new_dataset["health"].unique()
```

```
array(['hive being robbed', 'healthy', 'few varrao, hive beetles',
      'ant problems', 'missing queen', 'Varroa, Small Hive Beetles'],
      dtype=object)
```

# Directorios

```
# Directories
base_dir = "../data/"
train_dir = base_dir + "train/"
test_dir = base_dir + "test/"
healthy_dir = base_dir + "healthy"
nonhealthy_dir = base_dir + "nonhealthy"
```

## Primer modelo

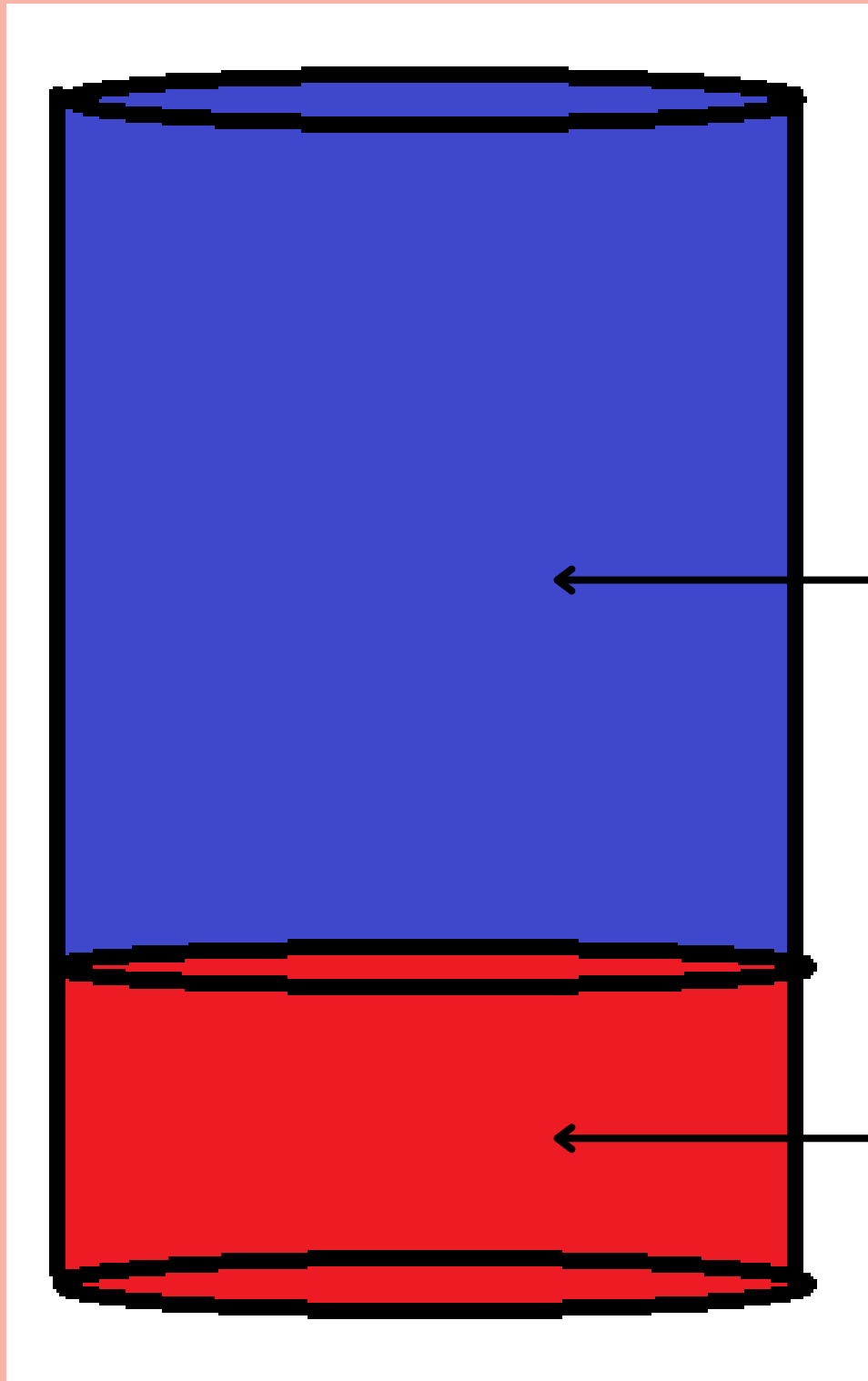
```
# Counting total of files in
for specie in ["healthy", "nonhealthy"]
    DIR = "../data/" + specie
    print(specie, len([name for name in os.listdir(DIR)]))
```

```
healthy 3384
nonhealthy 1051
```

## Segundo modelo

```
# Counting total of files in
for specie in ["healthy", "nonhealthy"]
    DIR = "../data/" + specie
    print(specie, len([name for name in os.listdir(DIR)]))
```

```
healthy 3384
nonhealthy 1788
```

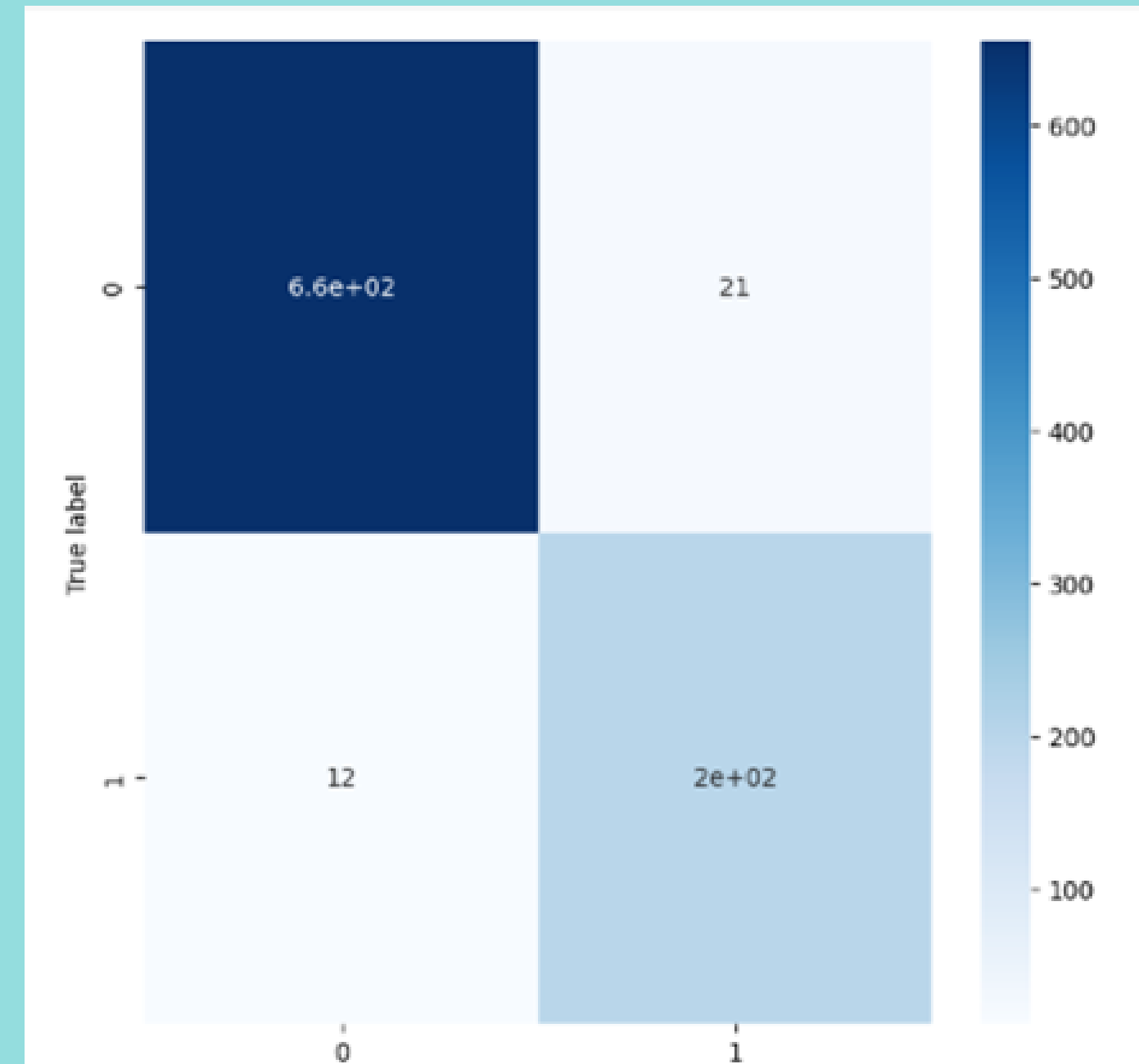
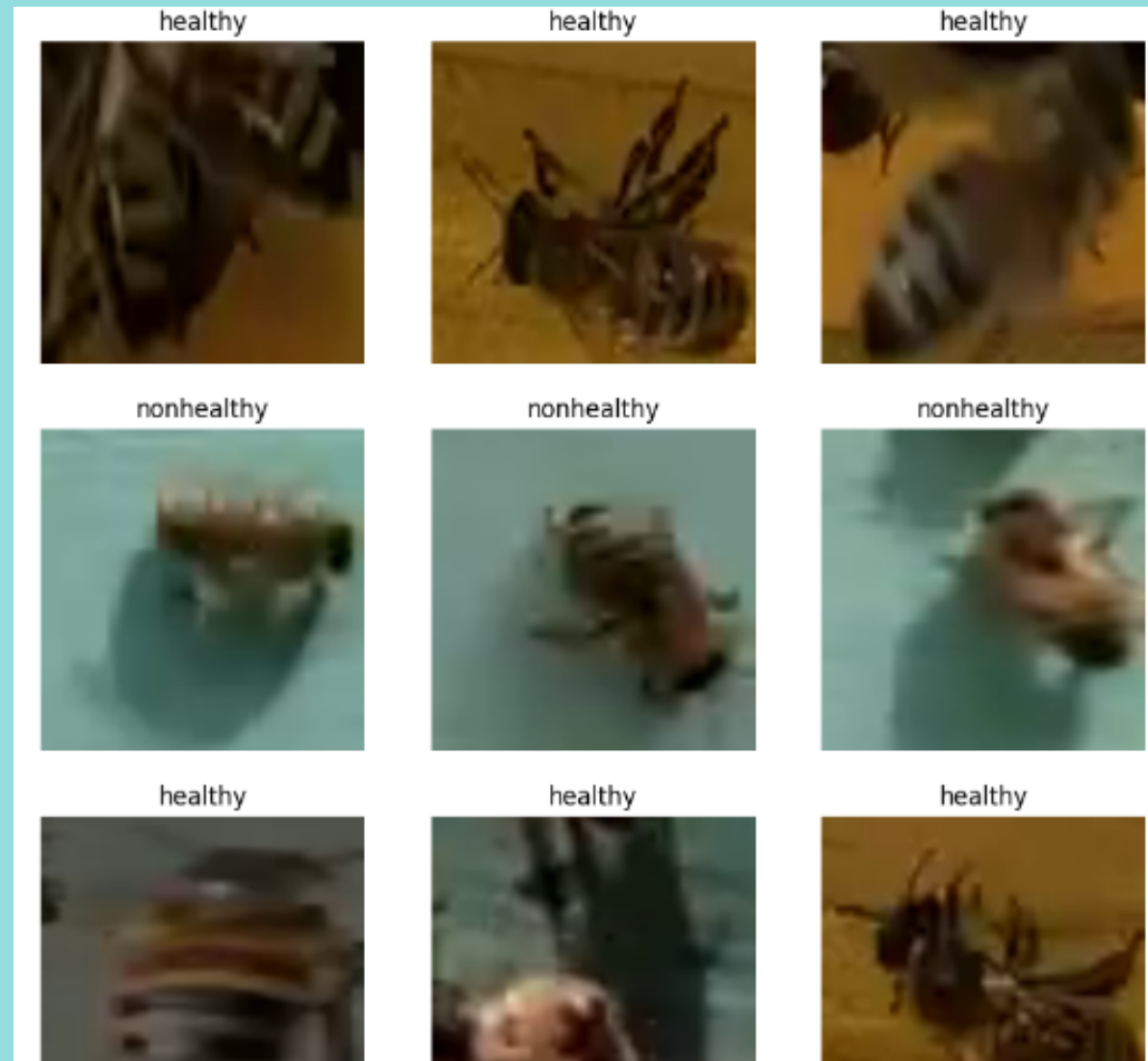


Train 80%

Test 20%

# RESULTADOS

## Primer modelo



```
model.evaluate(clean_test_dataset)
```

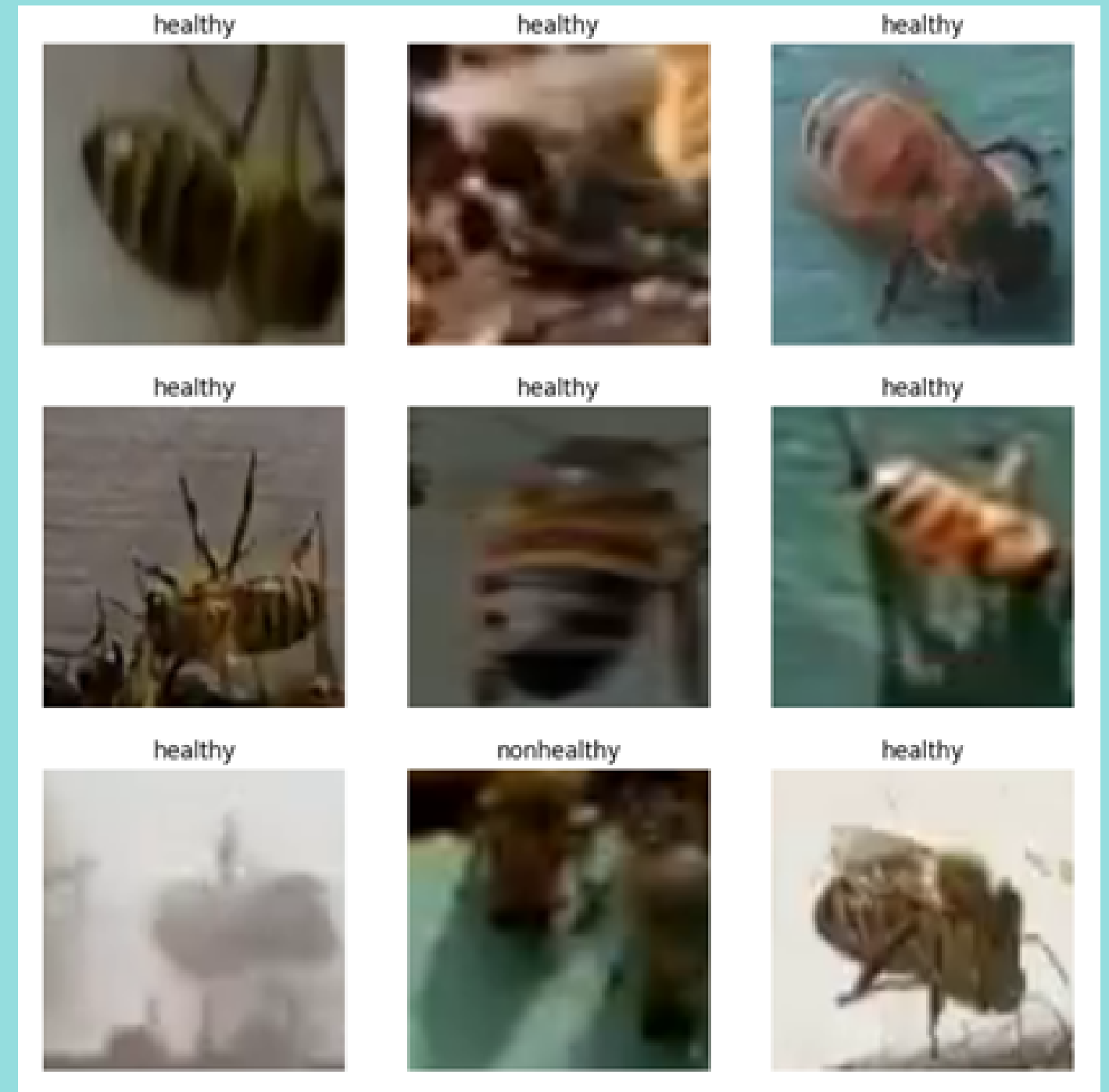
14/14 [=====] - 4s 203ms/step - loss: 0.1087 - accuracy: 0.9628  
[0.10870561003684998, 0.96275395154953]



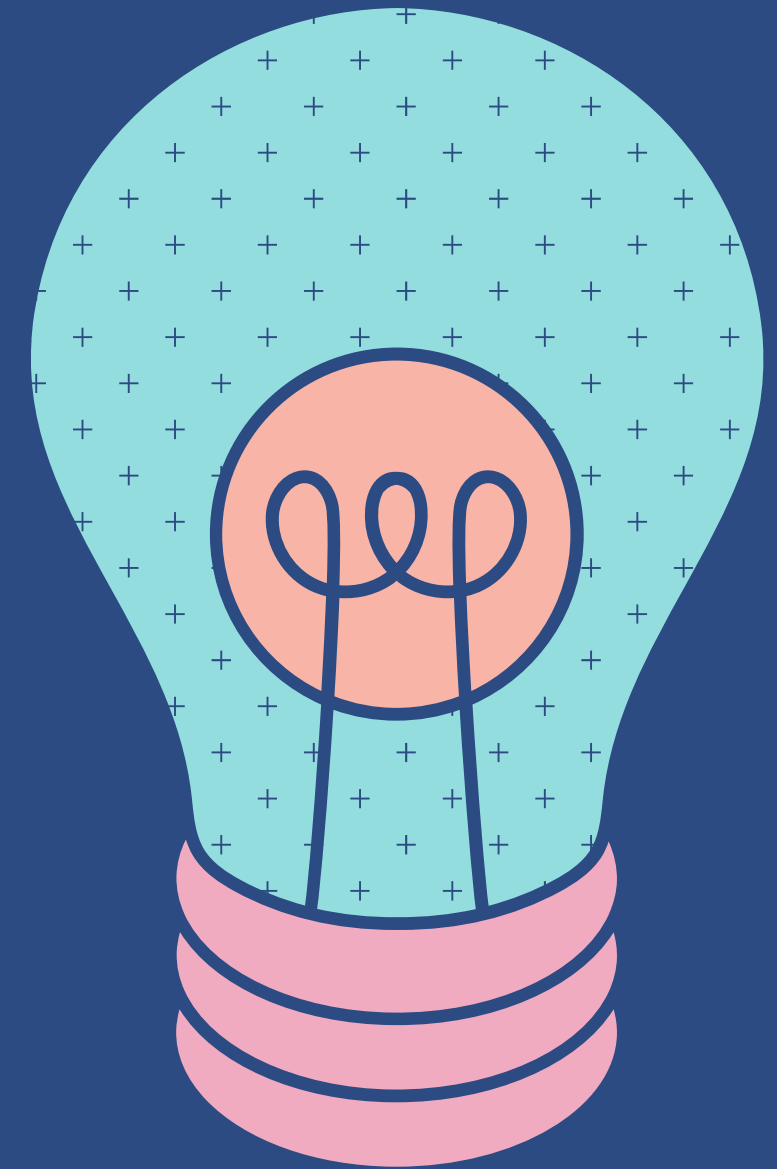
# RESULTADOS

## Segundo modelo

- loss: 7.3692 - accuracy: 0.6657



# MEJORAS A FUTURO Y CONCLUSIONES



# GRACIAS POR SU ATENCIÓN

SEMINARIO PROFESIONAL 1

