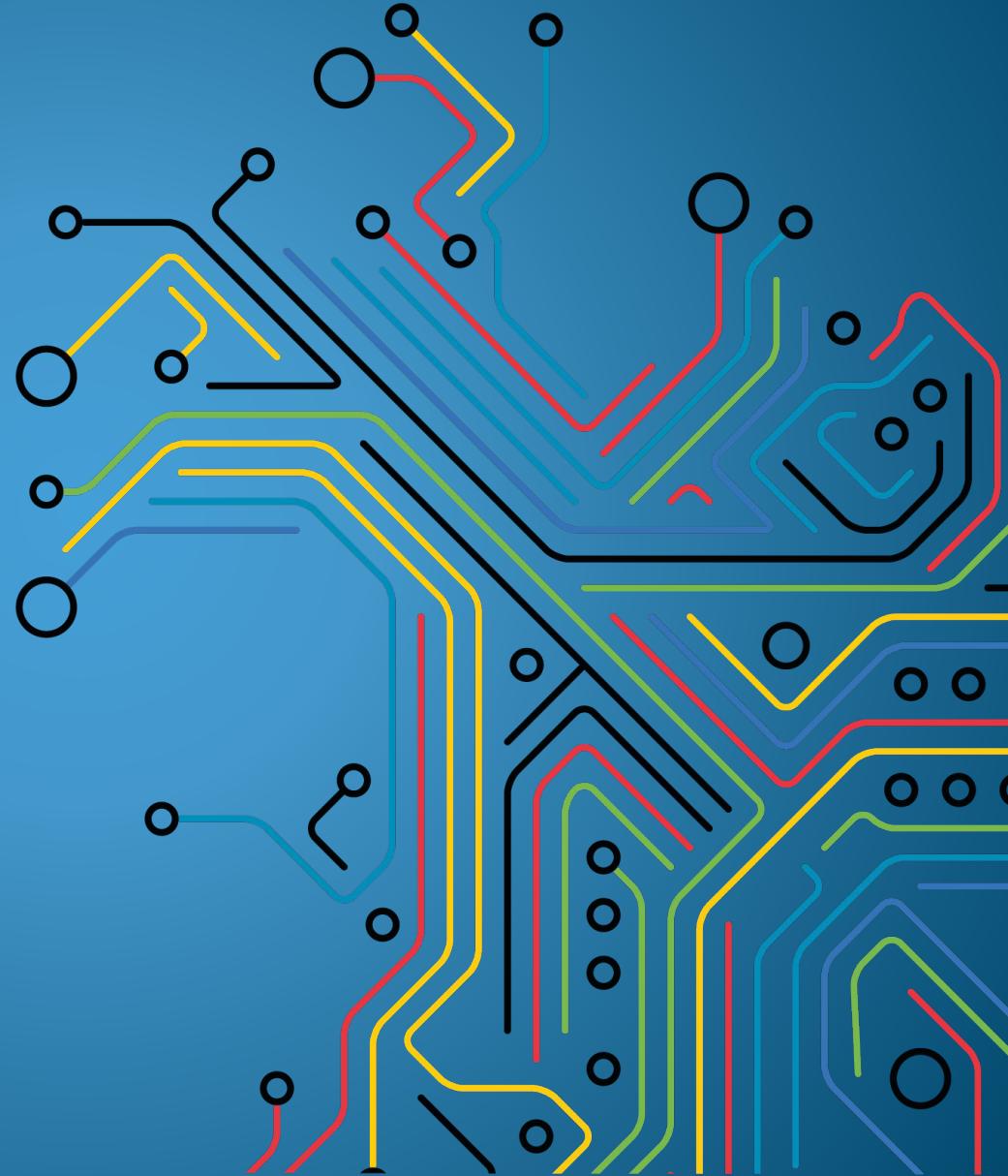


# CTMeet up

Laércio Pioli Junior



# Contents

About Me

Bachelor, Master & Ph.D.

Worked Projects

PhD. Research

INESC TEC Internship

How to use the INESCTEC Internship knowledge in  
my Ph.D.



# About Me

# Where I am from?



1	Russia	17,098,242
2	Canada	9,984,670
3	China	9,706,961
4	US	9,372,610
5	Brazil	8,515,767

Acre [164.123 km<sup>2</sup>] — Nepal [147.181 km<sup>2</sup>]  
Alagoas [27.778 km<sup>2</sup>] — Haiti [27.750 km<sup>2</sup>]  
Amapá [142.828 km<sup>2</sup>] — Tajiquistão [143.100 km<sup>2</sup>]  
Amazonas [1.559.159 km<sup>2</sup>] — Mongólia [1.566.000 km<sup>2</sup>]  
Bahia [564.733 km<sup>2</sup>] — França [643.801 km<sup>2</sup>]  
Ceará [148.920 km<sup>2</sup>] — Grécia [131.957 km<sup>2</sup>]  
Distrito Federal [5.779 km<sup>2</sup>] — Trinidad e Tobago [5.131 km<sup>2</sup>]  
Espírito Santo [46.095 km<sup>2</sup>] — Suíça [41.285 km<sup>2</sup>]  
Goiás [340.111 km<sup>2</sup>] — Finlândia [338.424 km<sup>2</sup>]  
Maranhão [331.937 km<sup>2</sup>] — Itália [301.338 km<sup>2</sup>]  
Mato Grosso [903.366 km<sup>2</sup>] — Venezuela [916.445 km<sup>2</sup>]  
Mato Grosso do Sul [357.145 km<sup>2</sup>] — Alemanha [357.168 km<sup>2</sup>]  
Minas Gerais [586.522 km<sup>2</sup>] — Espanha [504.645 km<sup>2</sup>]  
Pará [1.247.954 km<sup>2</sup>] — Angola [1.247.000 km<sup>2</sup>]  
Paraíba [56.585 km<sup>2</sup>] — Croácia [56.594 km<sup>2</sup>]  
Paraná [199.307 km<sup>2</sup>] — Senegal [196.712 km<sup>2</sup>]  
Pernambuco [98.311 km<sup>2</sup>] — Portugal [92.212 km<sup>2</sup>]  
Piauí [251.577 km<sup>2</sup>] — Guiné [245.836 km<sup>2</sup>]  
Rio de Janeiro [43.780 km<sup>2</sup>] — Dinamarca [42.925 km<sup>2</sup>]  
Rio Grande do Norte [52.811 km<sup>2</sup>] — Bósnia [51.197 km<sup>2</sup>]  
Rio Grande do Sul [281.730 km<sup>2</sup>] — Equador [283.560 km<sup>2</sup>]  
Rondônia [237.590 km<sup>2</sup>] — Laos [236.800 km<sup>2</sup>]  
Roraima [224.300 km<sup>2</sup>] — Guiana [214.970 km<sup>2</sup>]  
Santa Catarina [95.736 km<sup>2</sup>] — Hungria [93.030 km<sup>2</sup>]  
São Paulo [248.222 km<sup>2</sup>] — Reino Unido [243.610 km<sup>2</sup>]  
Sergipe [21.915 km<sup>2</sup>] — Israel [20.770 km<sup>2</sup>]  
Tocantins [277.720 km<sup>2</sup>] — Nova Zelândia [268.021 km<sup>2</sup>]

# Where I am from?



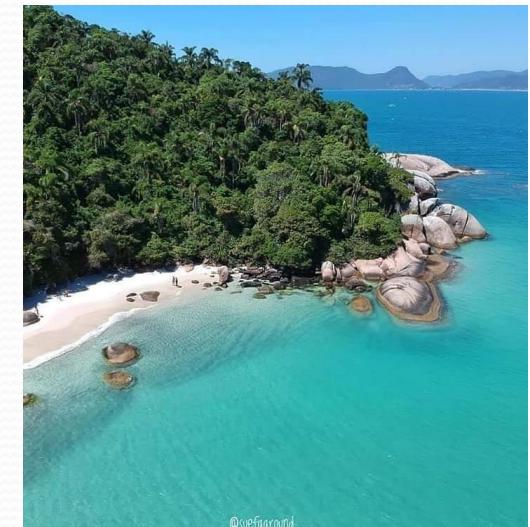
- Total area: 1,521,110 square kilometers.
- Total population: 12,325,232 inhabitants.



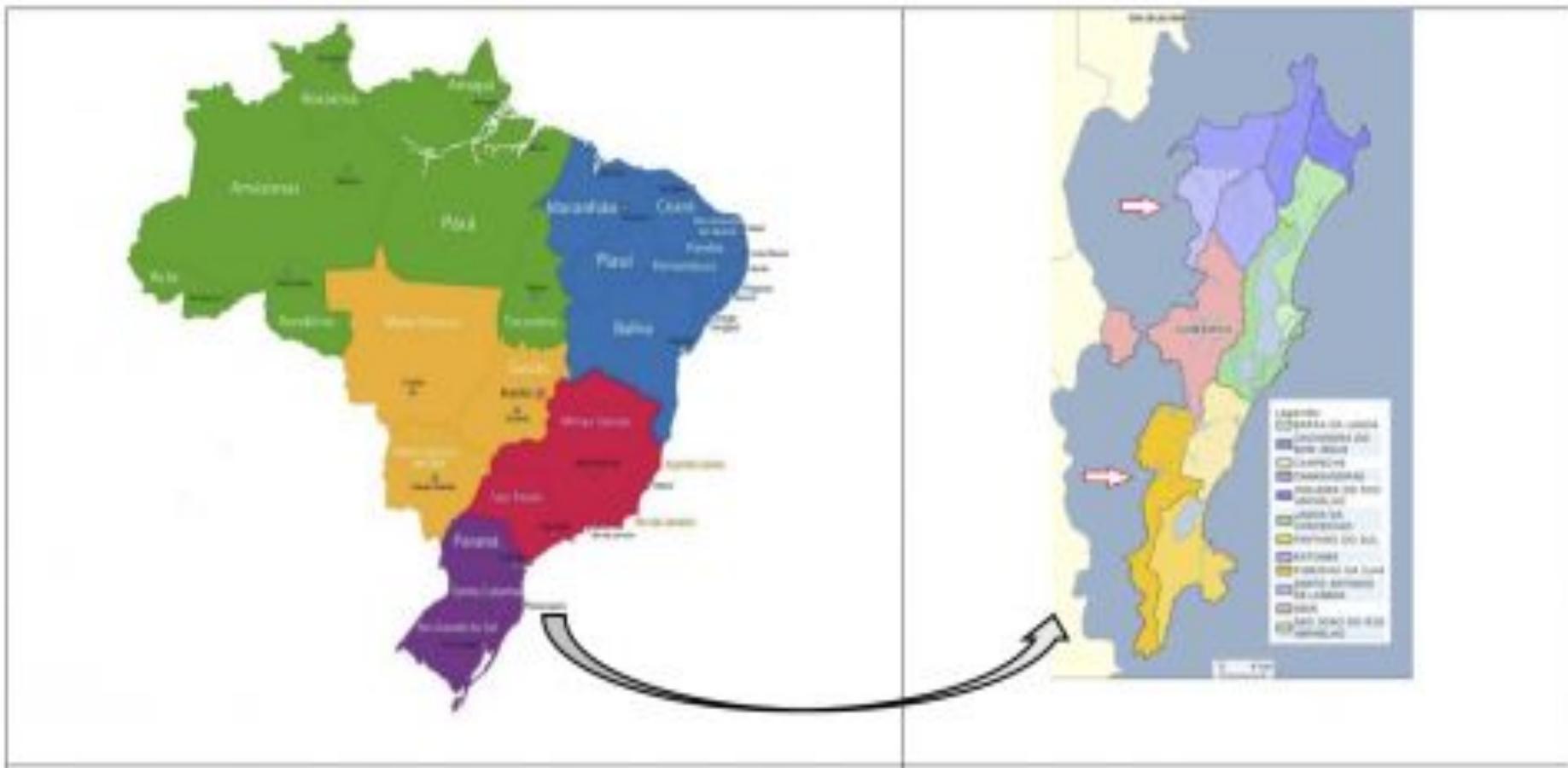
# São Paulo City



# Where I'm living right now? Florianópolis



# Where is located Florianópolis?



# Education

*Bachelor Degree – Computer Science – UFJF*

*Exchange: Universität Passau – Germany – 2016–2017*



## *Master Degree – Computer Science – UFJF*

*Internship: The 3rd RIKEN R-CCS HPC Youth Workshop – Japan – 2019*



## *Master Degree – Computer Science – UFJF*

*Internship: The 3rd RIKEN R-CCS HPC Youth Workshop – Japan – 2019*



*PhD. Degree – Computer Science – UFSC*

*Internship: INESC TEC 2023*



*PhD. Degree – UFSC*

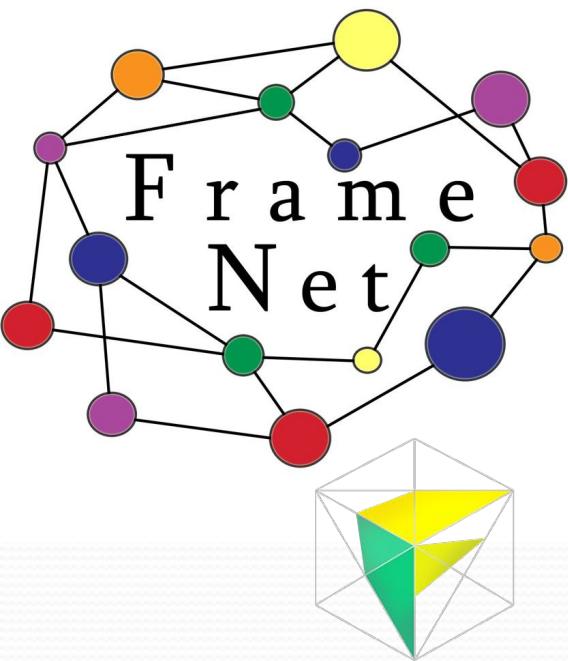
*Exchange: Incoming 2023*



**FEUP** FACULDADE DE ENGENHARIA  
UNIVERSIDADE DO PORTO



Projects I've Worked on.



**FRAMENET**  
**BRASIL**  
COPA DO MUNDO

Grid'5000

**PORIKEN**



**INESC**

**P&D**  
**BRASIL**

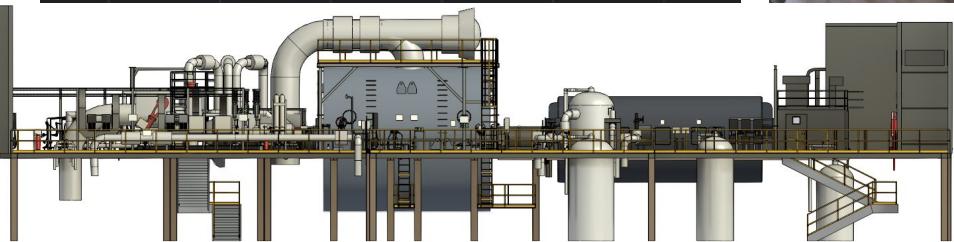
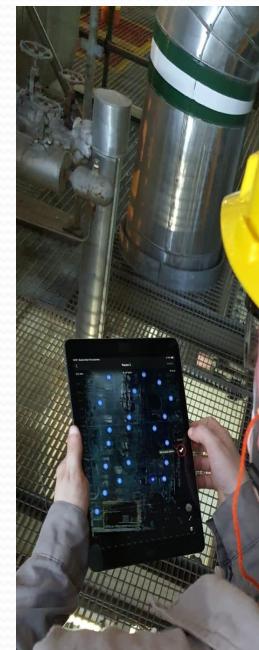
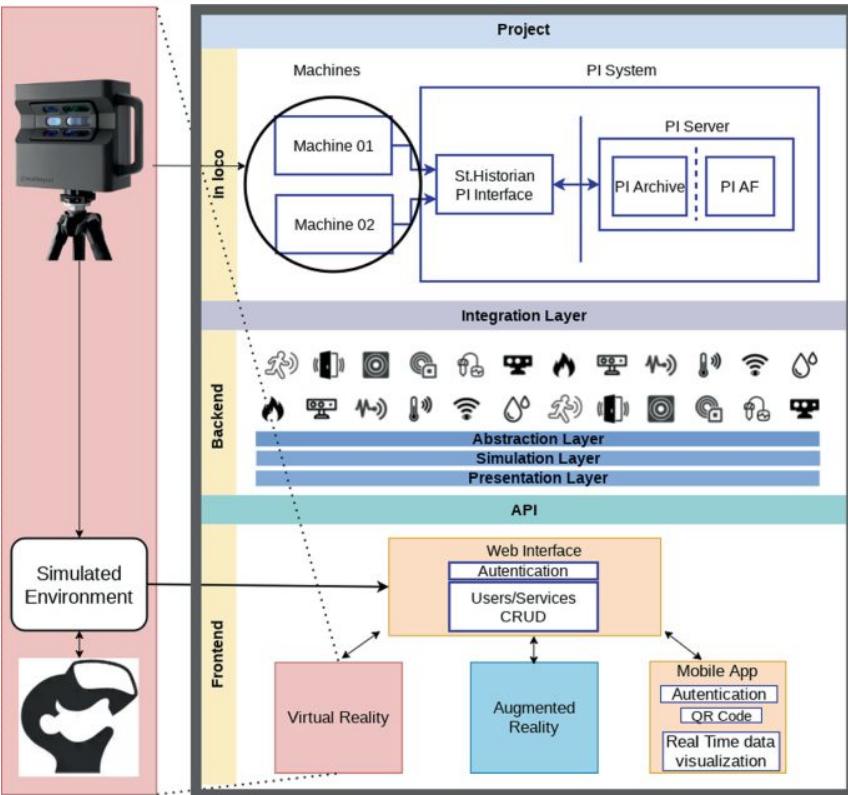


**UNIVERSITÄT**  
**PASSAU**

**INESCTEC**



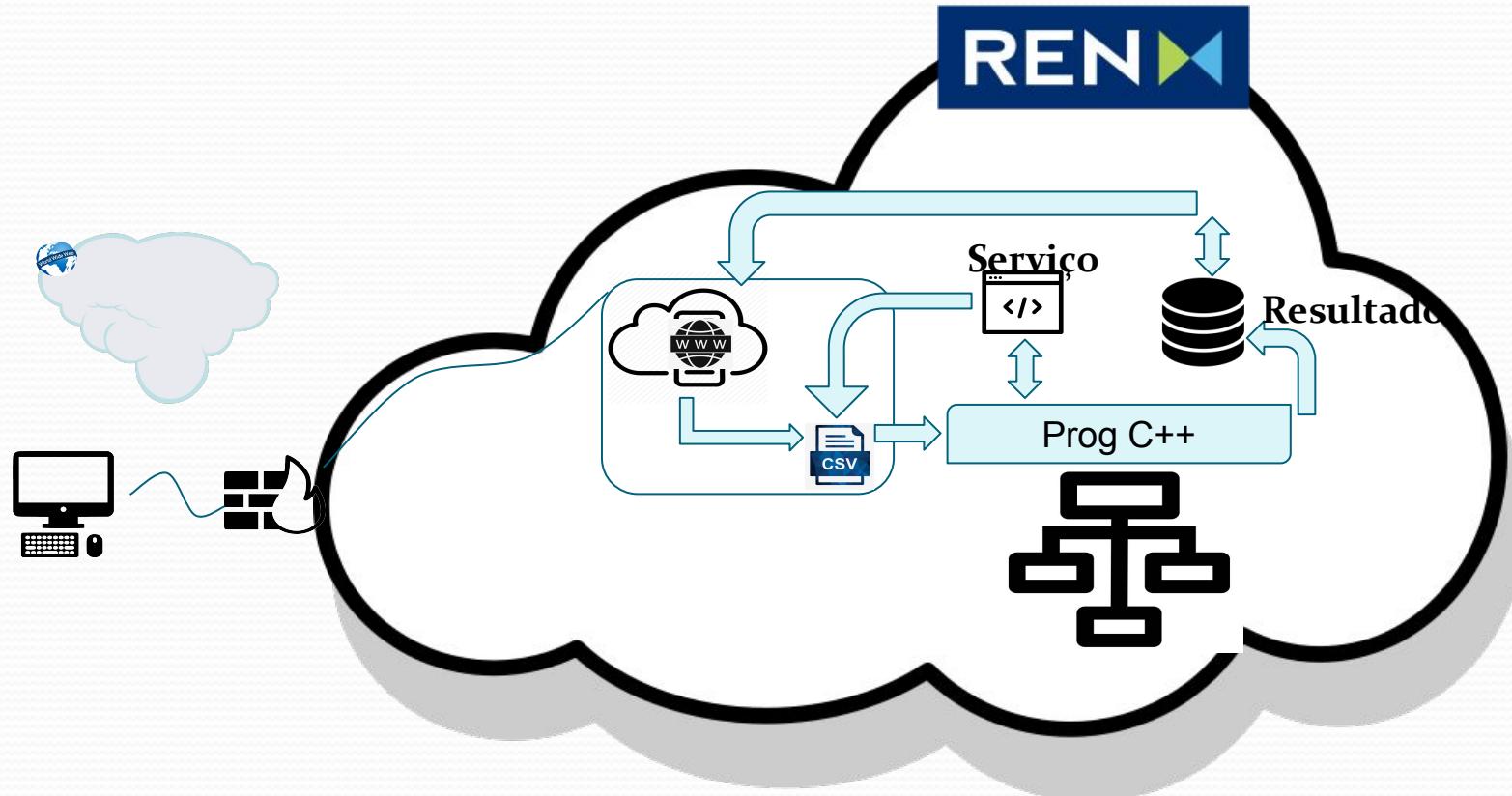
# INESC P&D BRASIL





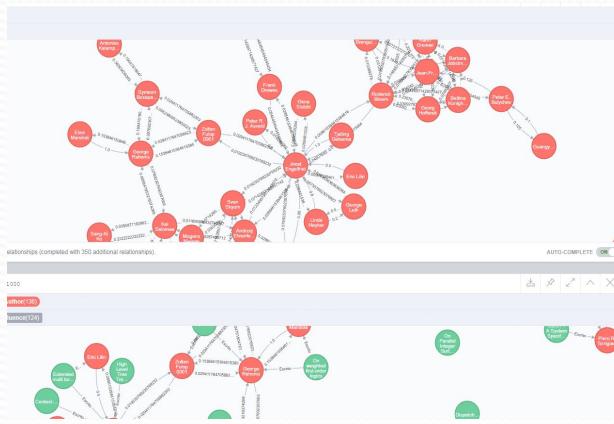
# INESCTEC

P&D  
INESC  
BRASIL





# Data Engineer



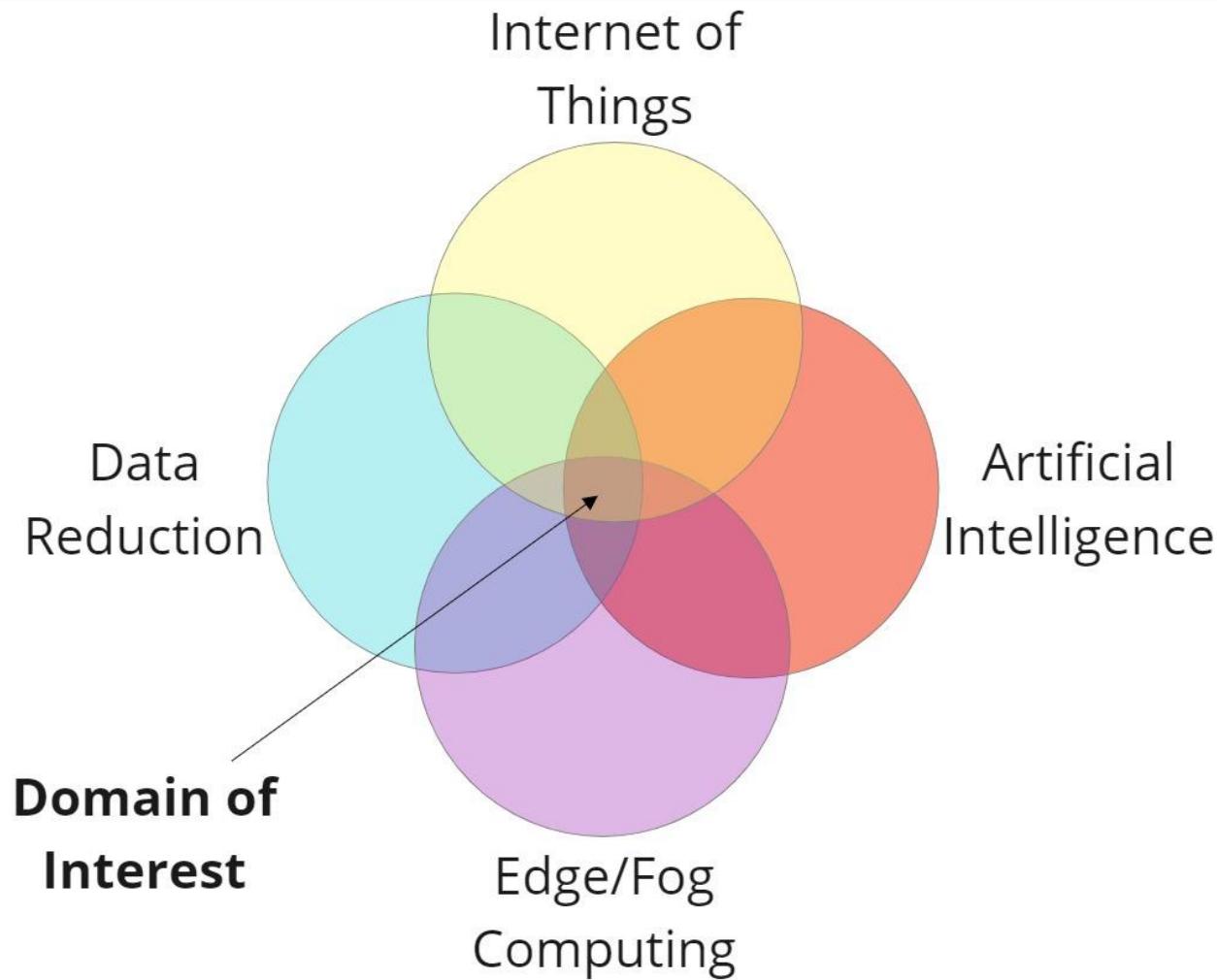
# Data Scientist



# Researcher

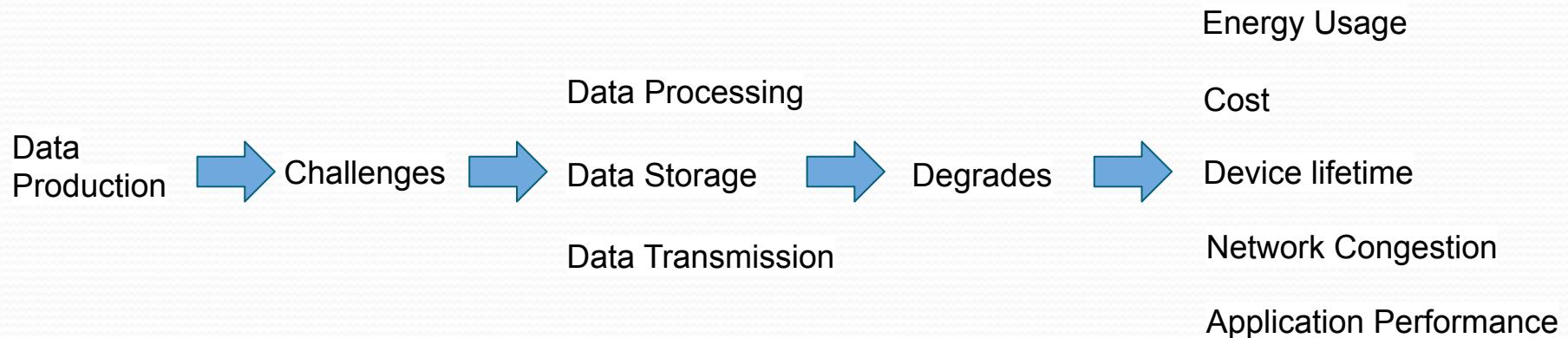
# Ph.D. Project

# Research Area



# Introduction

Data overwhelming

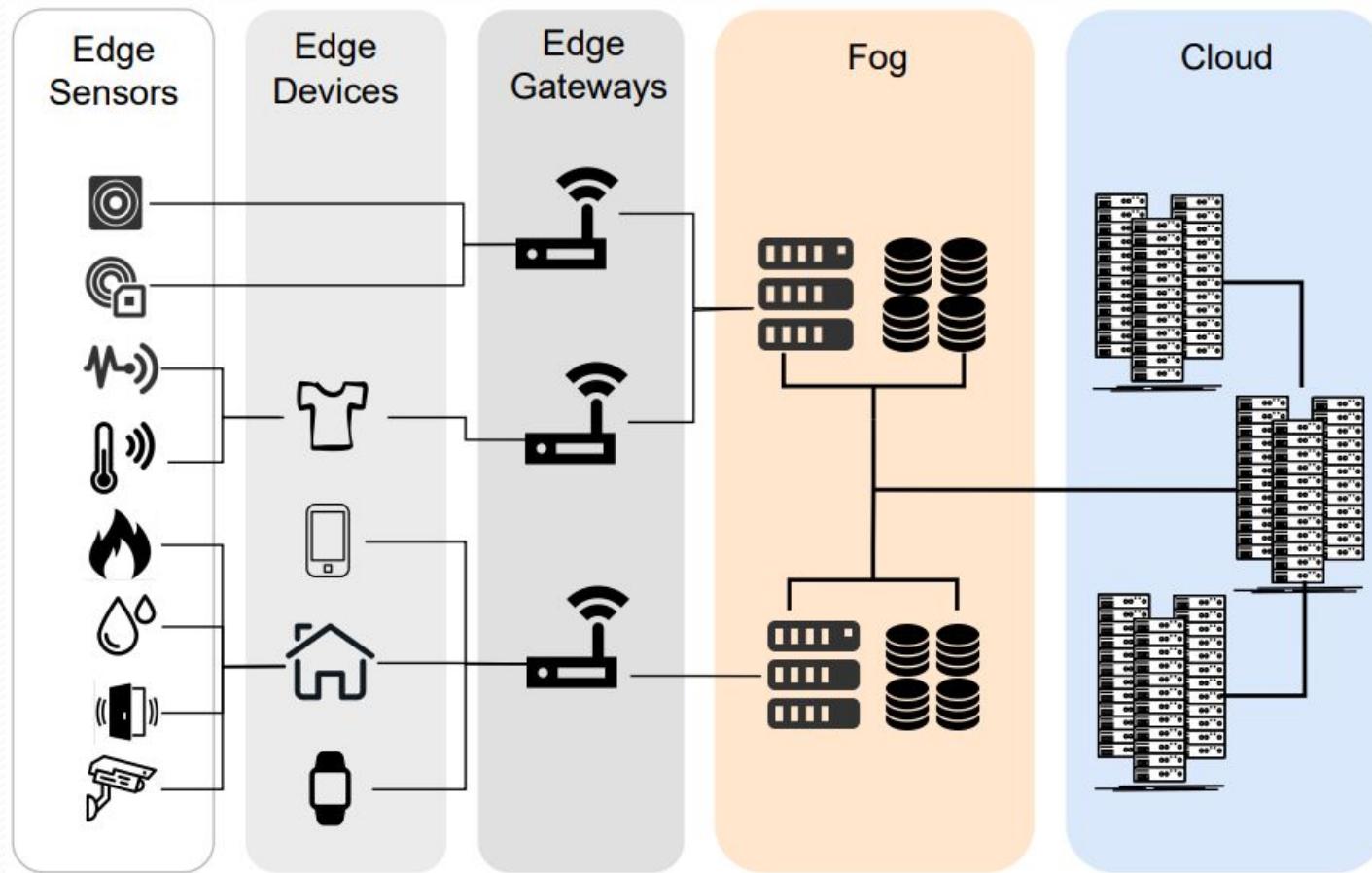


## Structured, semi-structured and unstructured data



# Introduction

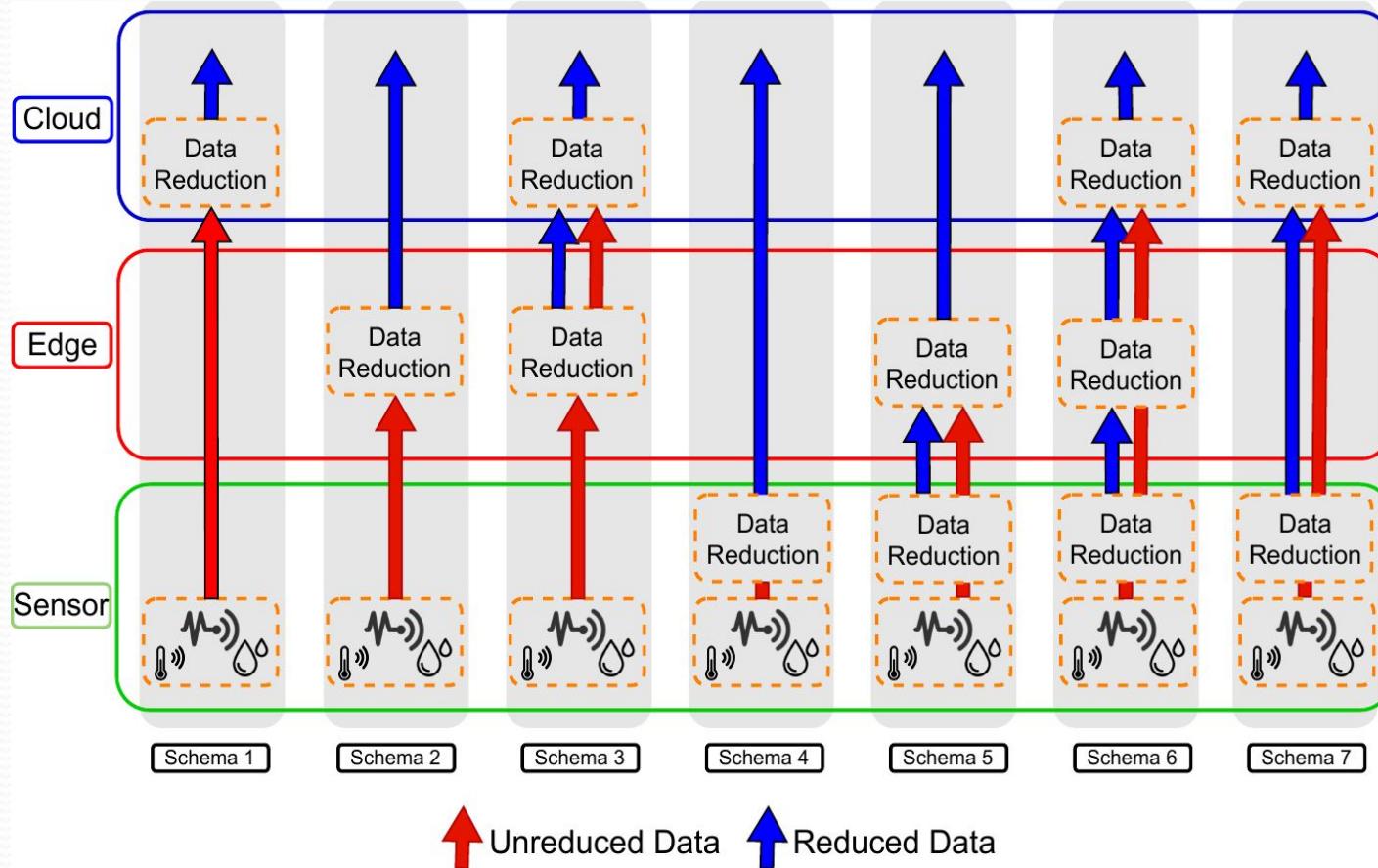
Problem Contextualization  
IoT Architecture Layers



# Introduction

## Problem Contextualization

Data Reduction Distribution over the IoT Infrastructure



# Research at INESCTEC

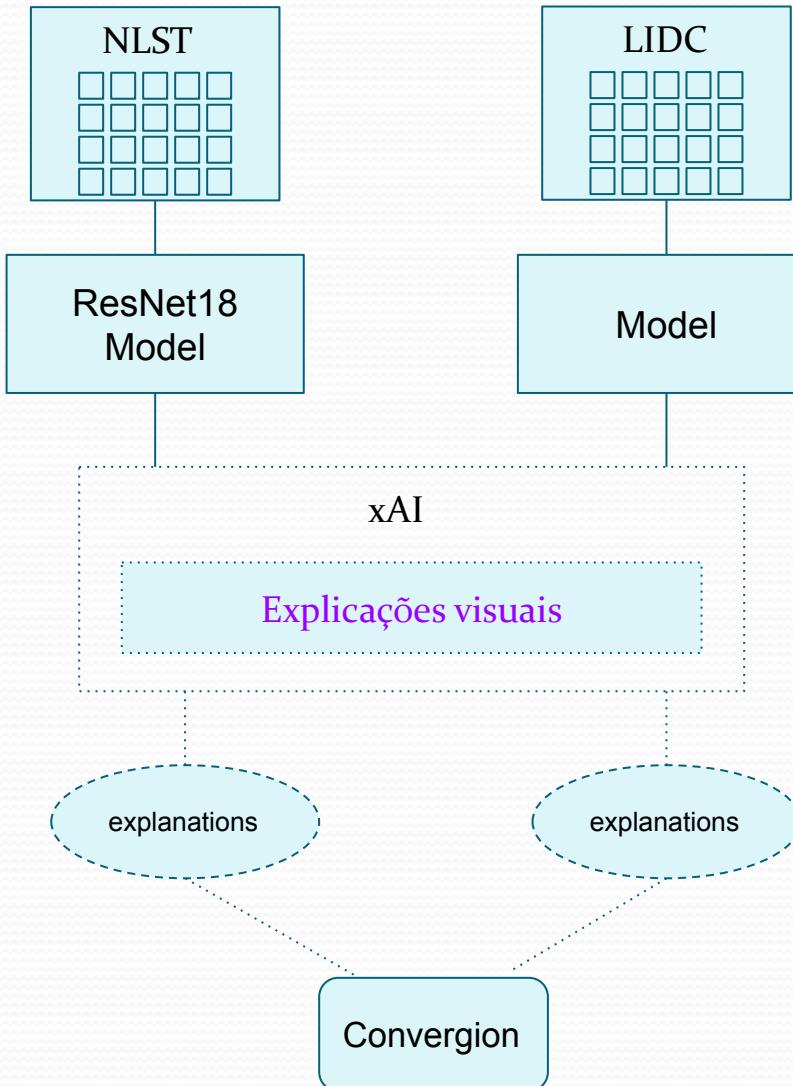


Explainable Artificial Intelligence (XAI) refers to the ability of an AI system to provide understandable and transparent explanations for its decisions or actions.

Traditional AI models, such as deep neural networks, are often considered black boxes because they make predictions or take actions without providing clear explanations for how they arrived at those results.

Post-Model

# Solution Work



Explicações visuais

Vanilla Saliency  
Maps

Integrated  
Gradients

Image Gradients  
Generation (raw)

Image Gradients  
(Integral)

LRP

DeepLift

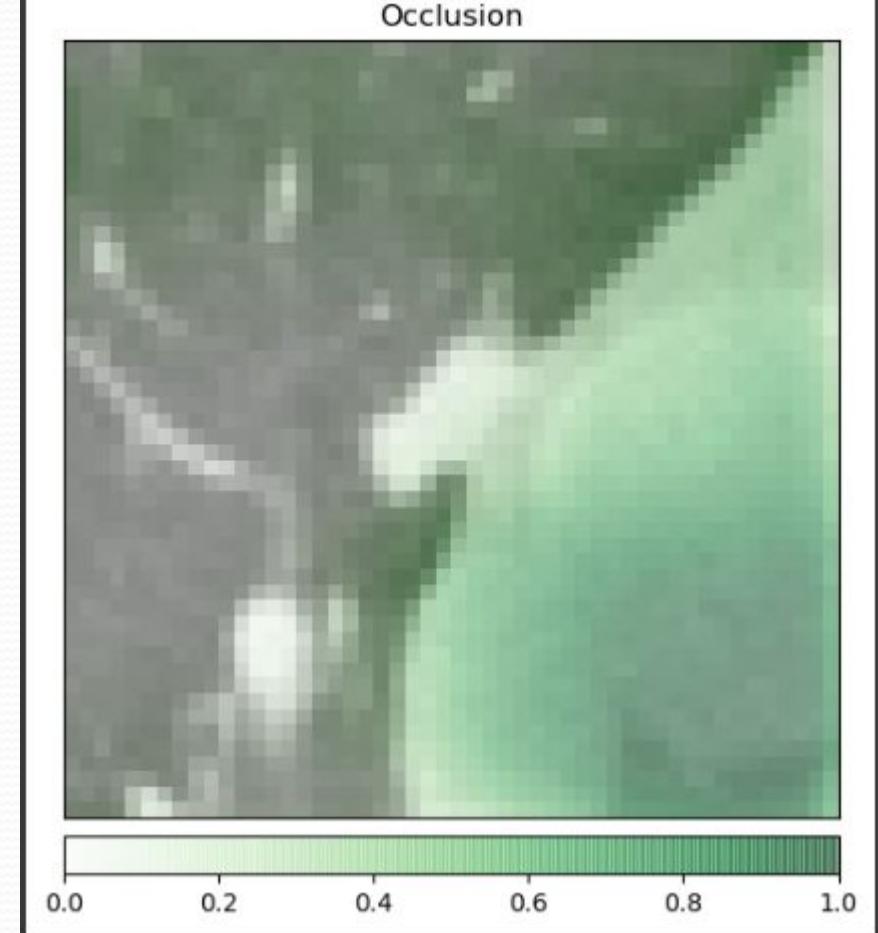
Convergion

# Preliminary Results

Original Nodule



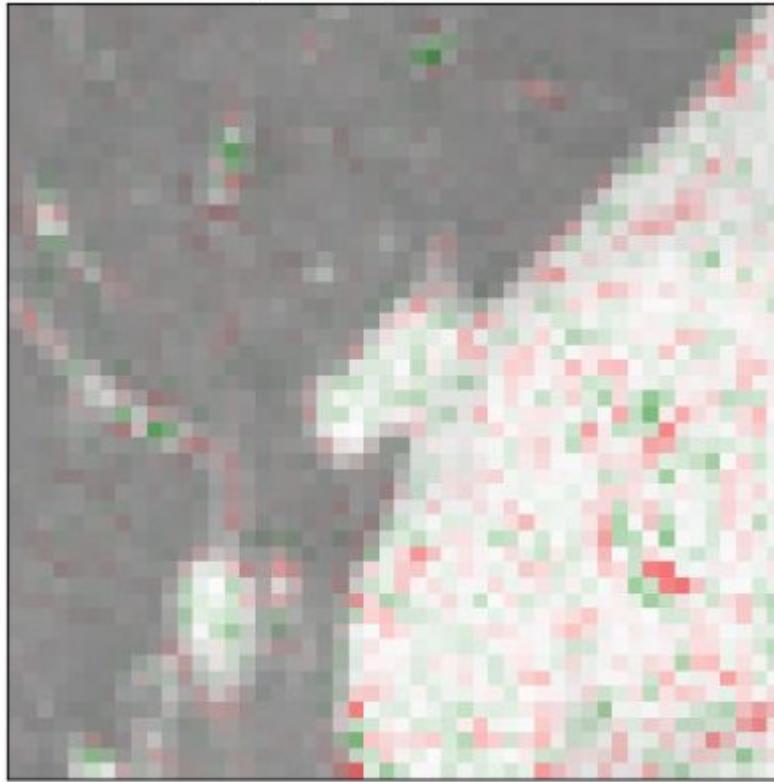
Oclusão



# Preliminary Results

Integrated Gradients = All values

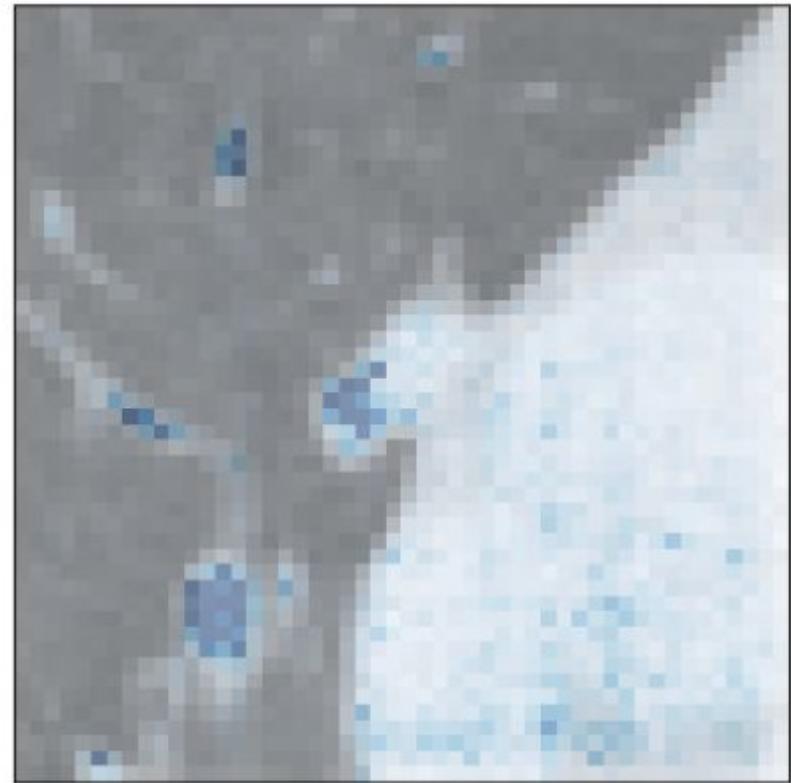
Overlayed Integrated Gradients



-1.00 -0.75 -0.50 -0.25 0.00 0.25 0.50 0.75 1.00

Integrated Gradients = Absolute Values

Overlayed Integrated Gradients  
with SmoothGrad Squared

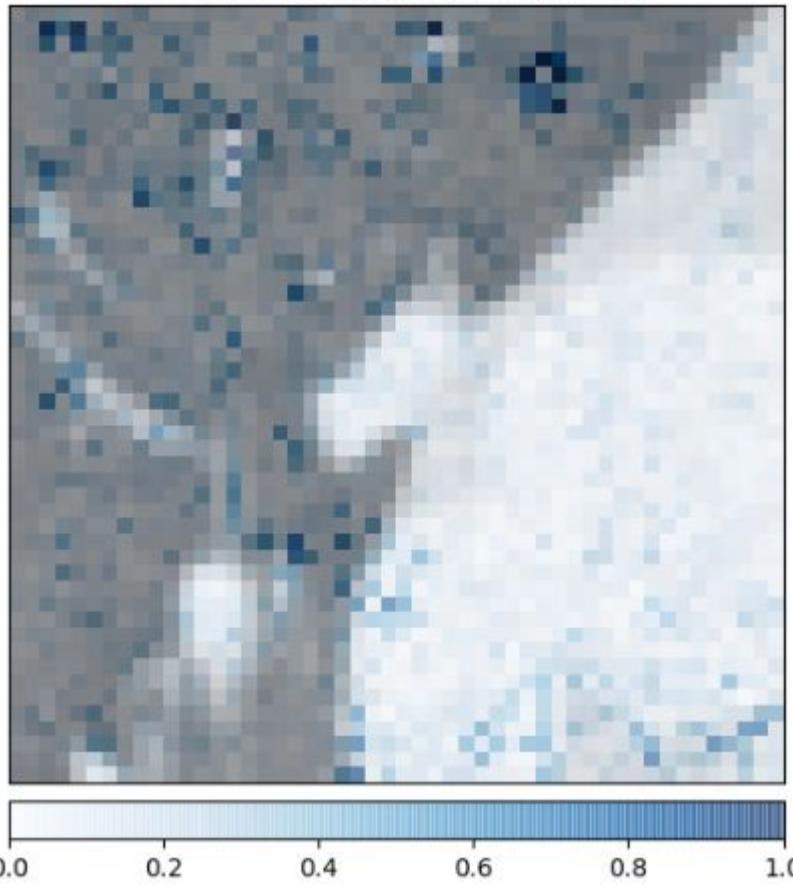


0.0 0.2 0.4 0.6 0.8 1.0

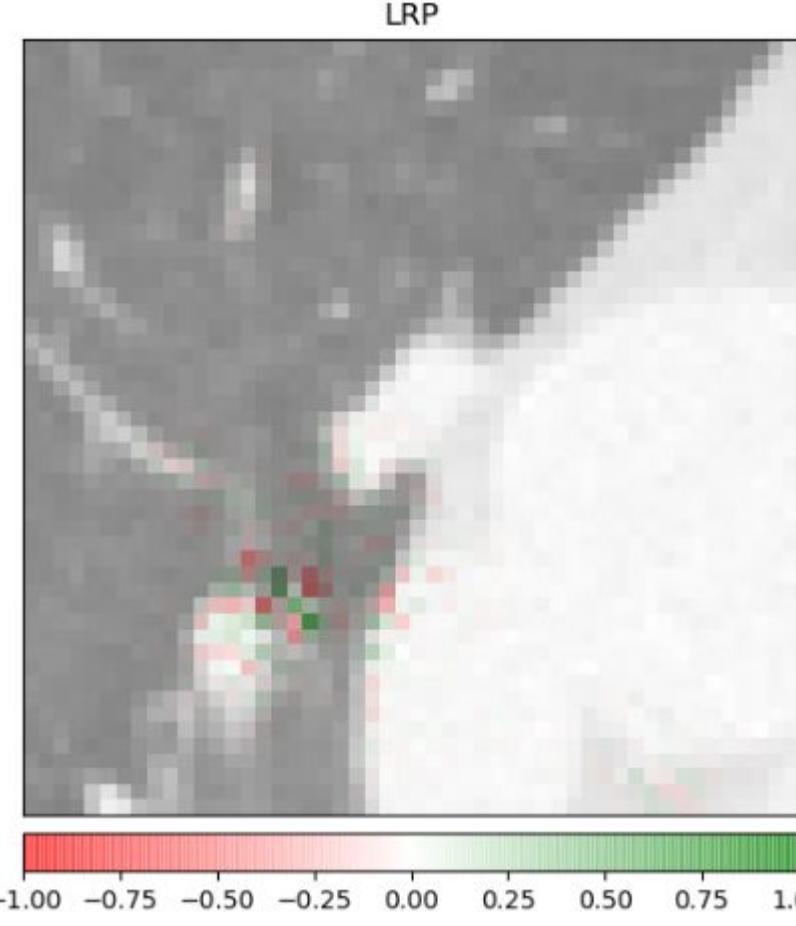
# Preliminary Results

## Saliency Maps

Overlaid Gradient Magnitudes



LRP





How to use this internship at the INESC  
TEC in my Ph.D. project?

Identify the most important data or identify data that has no meaning and then reduce it.

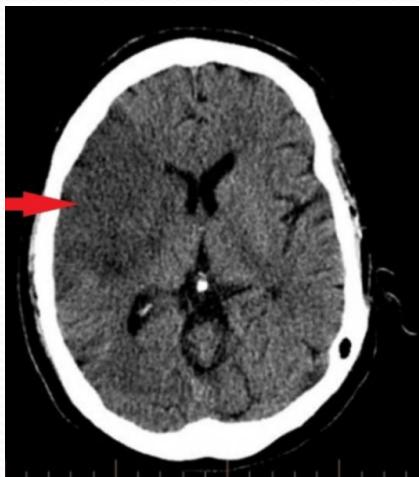
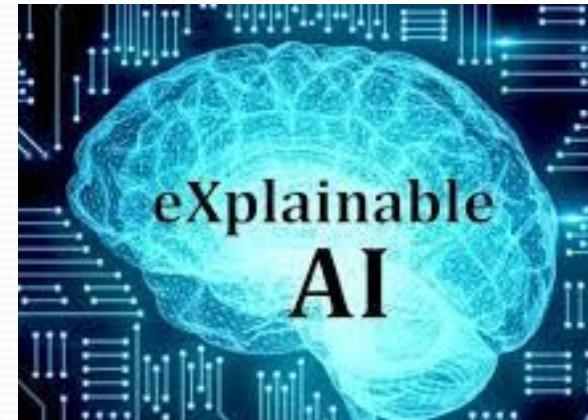
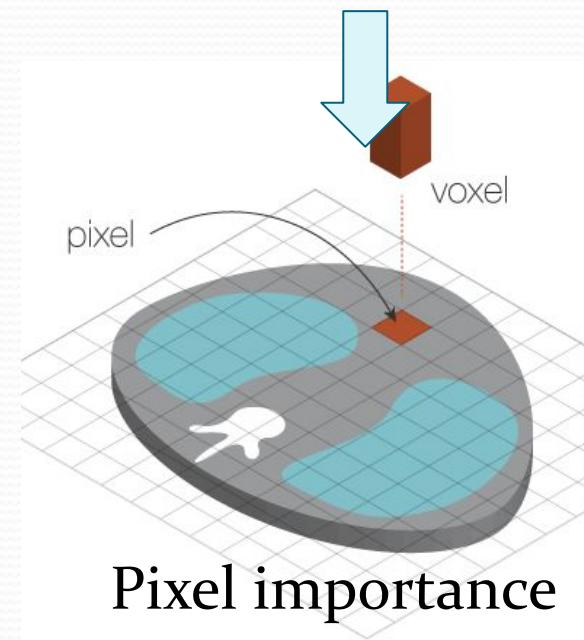
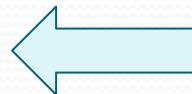


Image Data



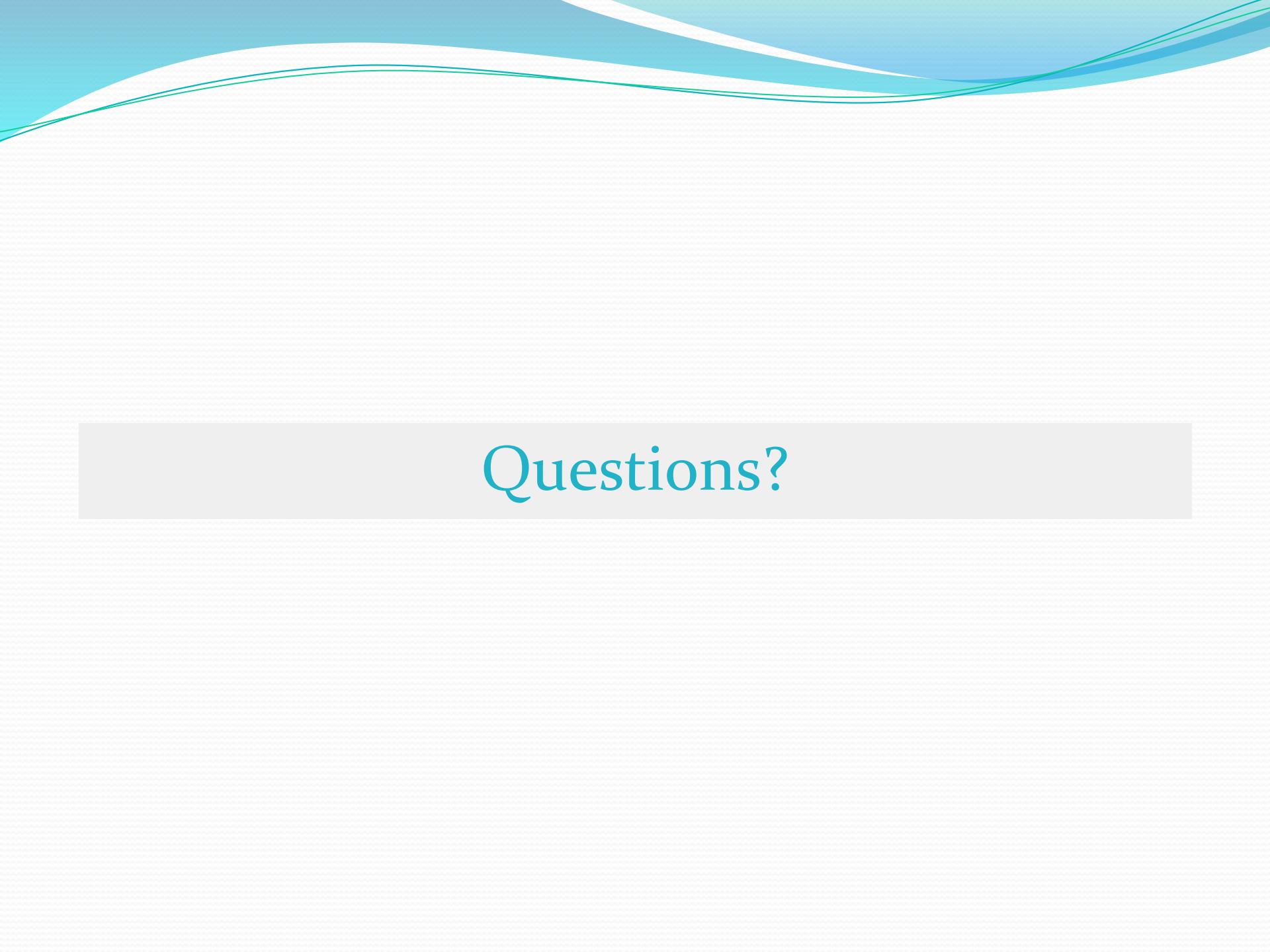
Reduced Data



Pixel importance

# How to use this internship at the INESC TEC in the Ph.D. project?

Using XAI to obtain the importance of medical image pixels, which can be any (CT, DICOM, etc.) to then apply DR approaches and reduce them in volume, helping IoT domains in computational performance.



Questions?