



UNIVERSITÀ DEGLI STUDI DI NAPOLI  
**FEDERICO II**

**itee**<sub>PhD</sub>  
information technology  
electrical engineering



**DIE**  
**TI**

**UNI**  
**NA**

**Patrizia Quaranta**

# **Fitness for work: Features and Pattern analysis**

**Tutor: Roberto Pietrantuono**

**co-Tutor: Giuseppe Cascone**

**Cycle: XXXVIII**

**Year: Second**

# Candidate's information

- MSc degree in Computer Engineering
- DIETI Research group: DESSERT
- PhD start date: 01/11/2022
- PhD end date: 31/10/2025
- Scholarship type: PNRR- DM 352
- Partner company: CML VESUVIO s.r.l.
- Period in company: 10 months of 12

# Summary of study activities

	Course	Seminars	Research
I Years	35	6	24
II Years	10	8,5	40,9
Total	45	14,5	64,9
Expected	30-70	10-30	80-140

- **Ad Hoc PhD Courses:**
  - Strategic Orientation for STEM Research & Writing
  - Machine Learning for Science and Engineering Research

# Research area

- Predictive modeling in health informatics using machine learning and causal inference.
- Identify risk factors related to work-related disease
- Occupational Health:
  - Fitness for work in Maritime Domain
  - Work-related disease domains

# Research activity: Overview

→ **Fitness for work:**  
physical and mental  
health status that  
enables a worker to  
perform his/her job  
safely and effectively.



# Research activity: Overview

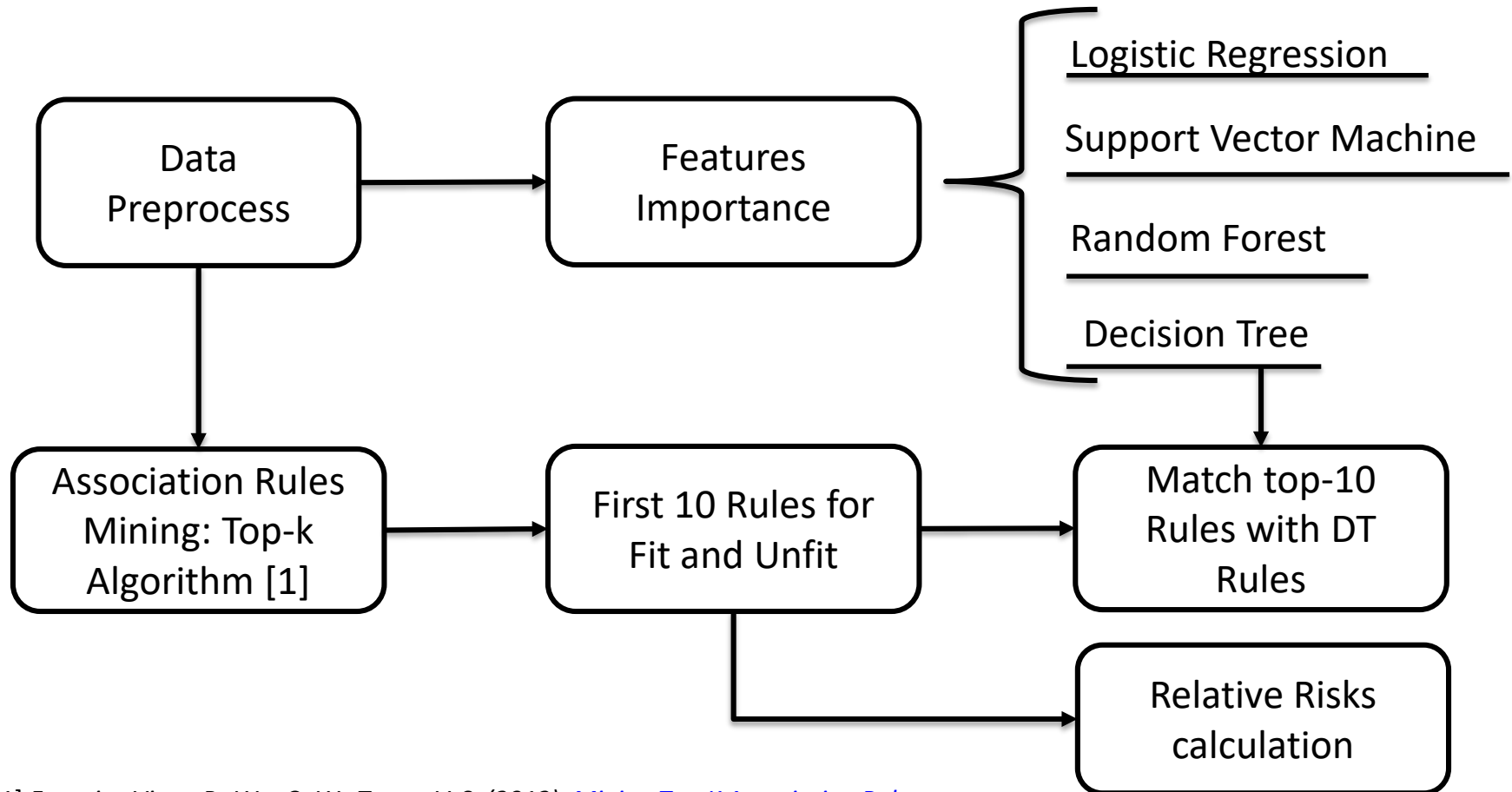
## Problems

- Probable inefficiency of Fitness for Work judgments due to human bias
- Lack of predictive insights
- Limited data-driven decision support

## Goal

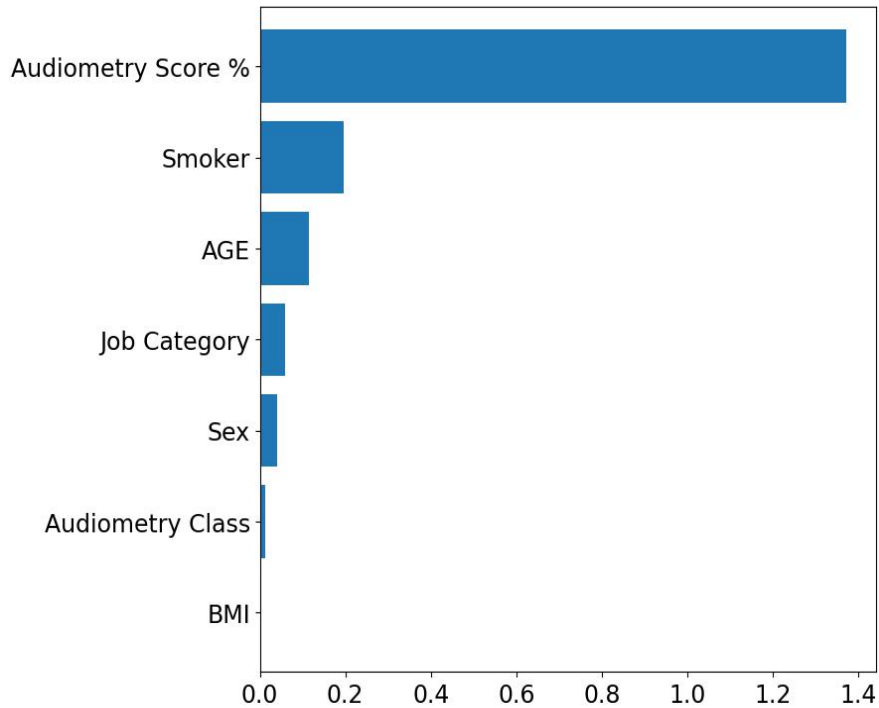
- Identify key features and patterns influencing Fitness For Work judgments

# Research activity: activity workflow

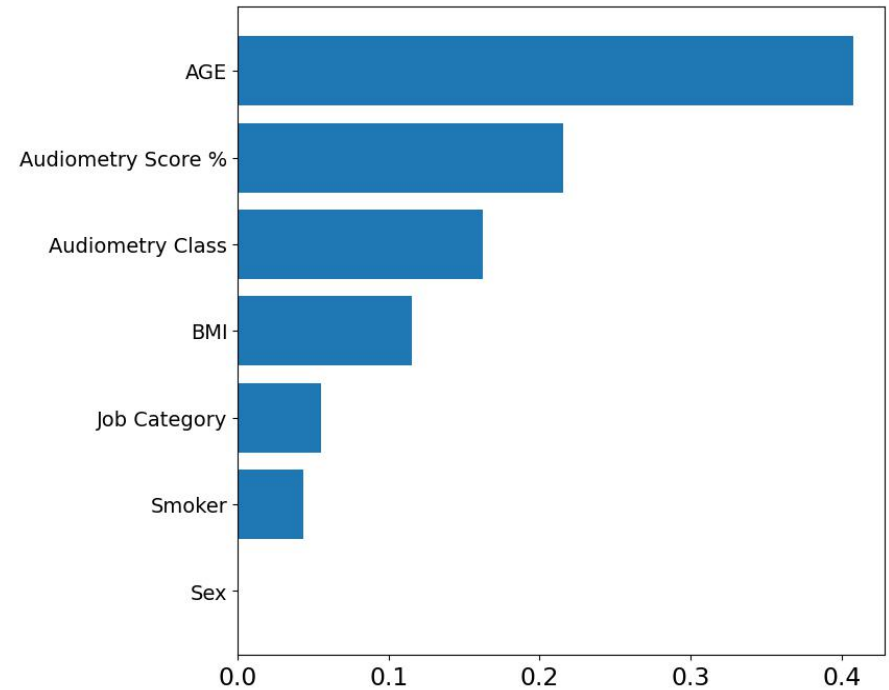


[1] Fournier-Viger, P., Wu, C.-W., Tseng, V. S. (2012). [Mining Top-K Association Rules](#). *Proceedings of the 25th Canadian Conf. on Artificial Intelligence (AI 2012)*, Springer, LNAI 7310, pp. 61-73.

# Research results: Features Importance



Logistic Regression [2]



Decision Tree

[2] A. Kumar, R. Gulati, S. Singhal e e. al., «The effect of smoking on the hearing status-a hospital-based study.,» Journal of clinical and diagnostic research : JCDR, vol. 7, n. 2, pp. 210-214, 2013.



# Research results: Top-4 Frequent Rules

Rule ID	Features Condition		Num of Instances	Confidence
Unfit_0	Age Range: [45, 58]	Audiometry Class: Class9	52	0,881355
Unfit_1	Age Range: [45, 58]	Audiometry Class: Class9 Sex: M	52	0,881355
Unfit_2	Audiometry Class: Class2 Class3a		53	0,929824
Unfit_3	Audiometry Class: Class2 Class3a	Sex: M	53	0,929824
Fit_0	Age Range: [18, 32]	Audiometry Class: Class0 Class1a Sex: M	531	0,970749
Fit_1	Age Range: [18, 32]	Audiometry Class: Class0 Class1a	534	0,970909
Fit_2	Age Range: [18, 32]	Sex: M	690	0,936227
Fit_3	Age Range: [18, 32]		693	0,936486

All the rules are matched with the rules extracted from the Decision Tree.

# Research products

[P1]	P. Quaranta, R. Pietrantuono, G. Cascone, <i>Analysis of Fitness-for-Work Impacting Factors in the Maritime Domain,</i> <b>International Journal of Safety and Health at Work,</b> Submitted
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# Thank you for the attention!

