Vincenzo Norman Vitale

Tutor: Prof. Sergio Di Martino

XXXIV Cycle - I year presentation

Industry 4.0: Storing, Retrieving and Mining sensor
data for Predictive Maintenance

Background

- Master Degree In Computer Science
  - Thesis: "A protocol for automatic collection of information to generate advanced reports in cultural heritage"
- Fellowship: "*Industry 4.0: Storing, Retrieving and Mining sensor data for Predictive Maintenance*" supported by AvioAero a GE Aviation Business
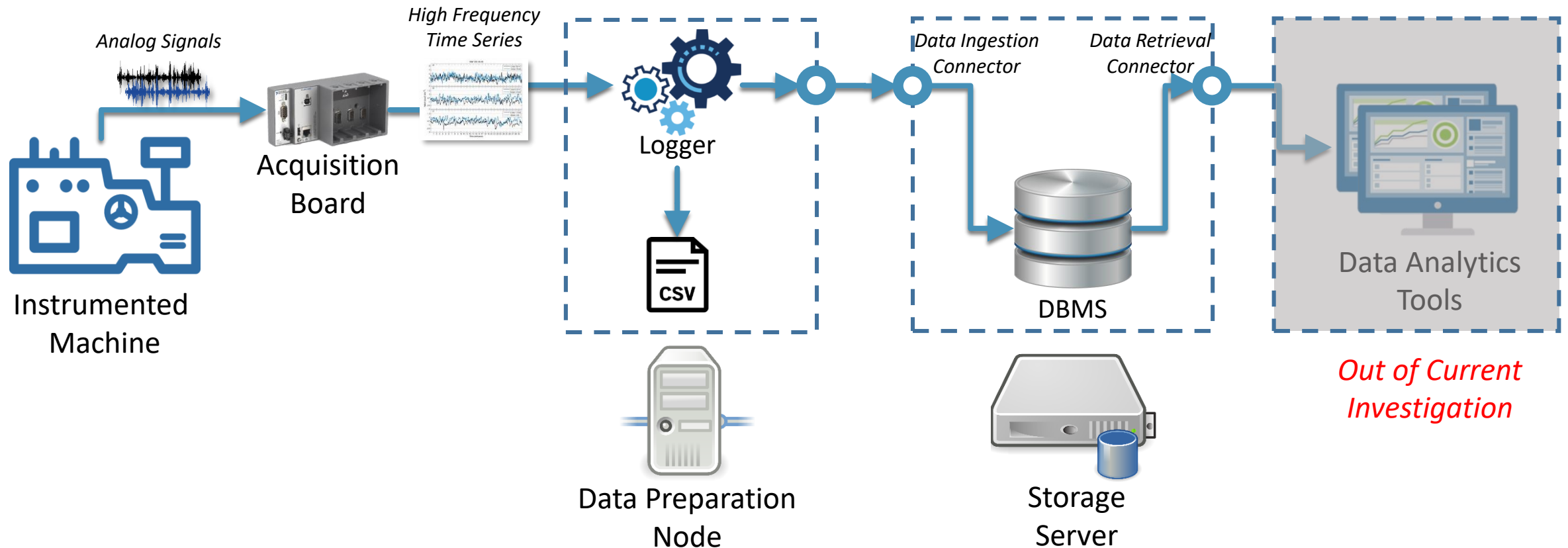
Problem

Massive Time Series Management and Forecasting, in two real world scenarios:

• Very High frequency Time Series from IIoT

• Geo-referred Time Series about Mobility

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Problem: IIoT Scenario
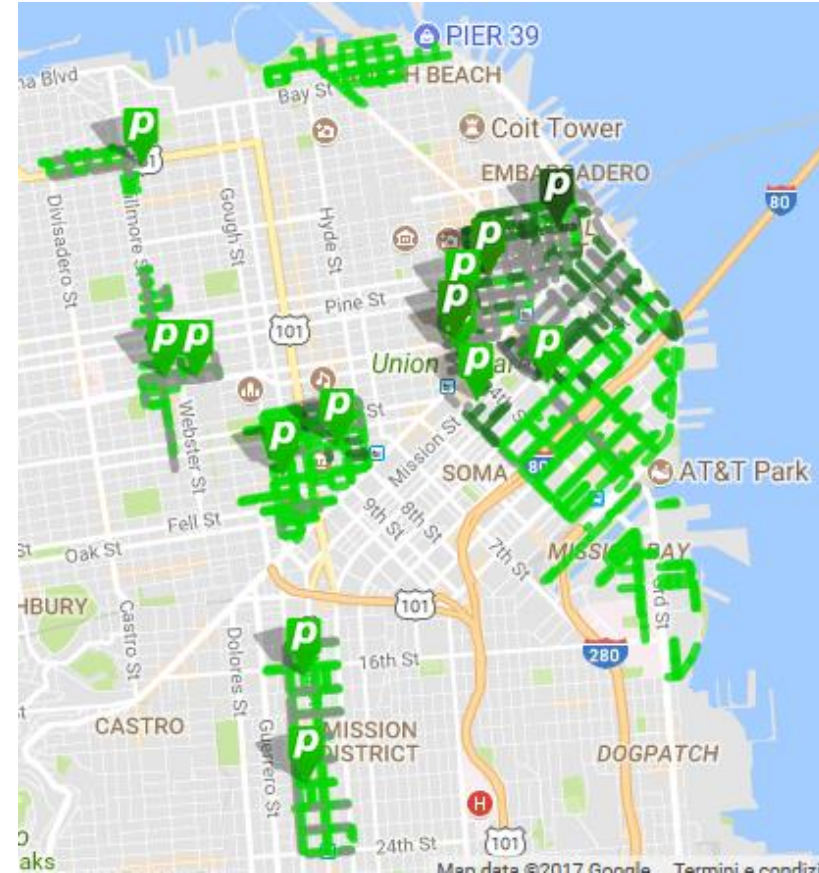
Research Activity: IIoT Scenario

Definition of an Edge Computing architecture for Big Data management in IIoT.

- KPI definition for Massive TS Ingestion/Retrieval
- Empirical Benchmarking of different technical solutions

Problem: Geo-referred Time Series

- Two Dataset:
  - San Francisco:
    - 5 Months
    - ~35 million records
  - Melbourne:
    - 7 Years
    - >1 billion records

Research Activity: Geo-referred Time Series

Define an Architecture and/or methodology to manage Spatial Time Series for Predict Mobility Phenomena able to:

- Exploit Geographical Features
- Include data Cleansing

Products

- "Industrial Internet of Things: Persistence for Time Series with NoSQL Databases" for "28th IEEE International Conference on Enabling Technologies: Infrastructure for Collaborative Enterprises" WETICE 2019

- "Investigating the Influence of On-Street Parking Guidance Strategies on Urban Mobility" for "6th International Conference on Models and Technologies for Intelligent Transportation Systems" IEEE MT-ITS 2019 Conference

- "Comparing Different On-Street Parking Information for Parking Guidance and Information Systems" for "30th IEEE Intelligent Vehicles Symposium" IV 2019

- "An Industrial Experience on Massive Time Series Persistence for IIoT", about to be submitted to Elsevier Journal of Big Data Research

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Next Years

1. Define and Validate Time Series Prediction techniques:
    1. Industrial context
    2. Intelligent Transportation System
2. Improve Capabilities of Time Series Management Systems
3. Improve Time Series Forecasting
    1. Predictive Maintenance
    2. Parking Prediction

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Next Years

	Credits year 1								YR 2	YR 3		
	Estimated	1 bimonth	2 bimonth	3 bimonth	4 bimonth	5 bimonth	6 bimonth	Summary	Estimated	Estimated	Total	Check
Modules	20		1.2	3	3		6	13.2	20	0	33.2	30-70
Seminars	5	0.4	0.2		0.8		1	2.4	10	0	12.4	10-30
Research	35	8	8	6	10	6	8	46	40	60	146.0	80-140
	60	8.4	9.4	9	13.8	6	15	61.6	70	60	191.6	180

Thank you for listening.