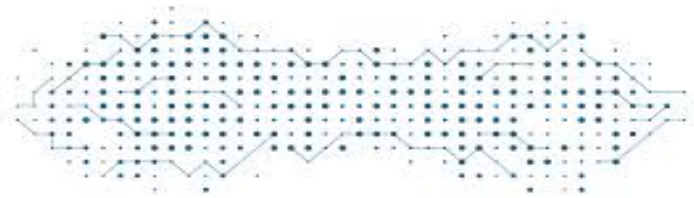
SIEMENS Industry 4.0 – MindSphere Hackathon



Team Name	NPCompete			
Participant Name	Institute	Degree	Year	Branch
Anuprava Chatterjee	IIT Kharagpur	B.Tech	2017-2021	Electrical Engineering
Prabhpreet Singh Sodhi	IIT Kharagpur	B.Tech	2017-2021	Computer Science
Prashant Shishodia	IIT Kharagpur	B.Tech	2017-2021	Computer Science

KSHITIJ 2019 – IIT KGP

SIEMENS PLM

NX Teamcenter Simcenter Tecnomatix Mindsphere PLM Components Polarion Mentor Manufactuing OperationsCenter Solid Edge TIA Portal

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Problem Statement - 01

Problem as we understood :

- Necrosis during Hip Arthroplasty, is caused when temperature around the cells go above 55 degrees. This causes pain, and may lead to further complications.
- So our goal is to make appropriate predictions based on datasets, about safe values of RPM, and predict temperature from sensor data.

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Project HARNEAS : Hip Arthroplasty Necrosis Avoidance Device

Salient Features

- Temperature predictions based on parameters, **learned** from previous executions.
- Appropriate **notifications and alerts**, based on both expected and received data.
- Includes a detailed analysis of **approximate allowable parameters** under different conditions as a pre-operation instruction to the medical professional.

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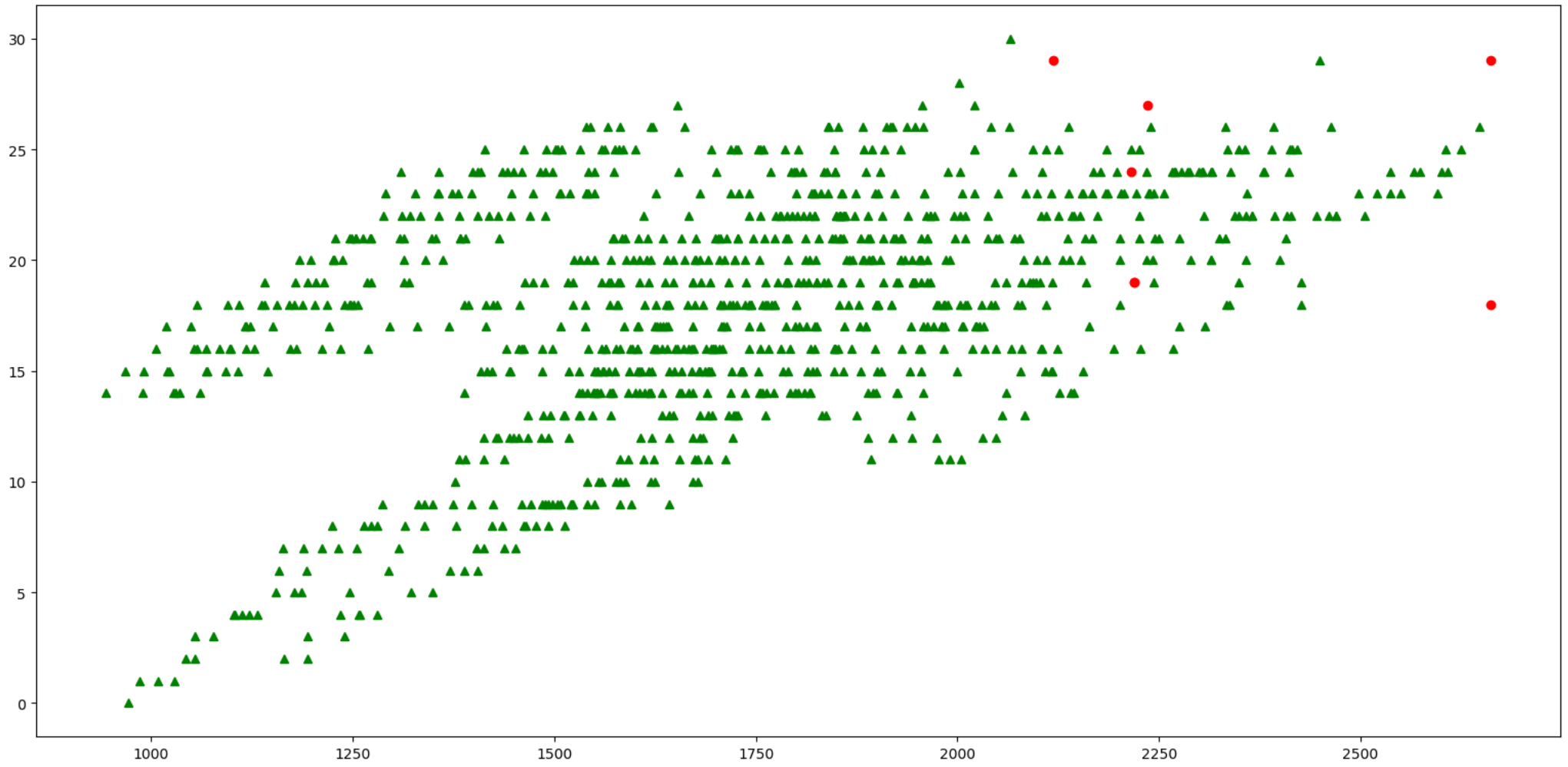
Basic Technicalities

- **Machine Learning Model**, based on mathematical regression and anomaly detection techniques
- **WebApp**, based on VanillaJS, HTML, CSS frameworks, FileUploader API and JSON management, POSTMAN
- **Mindsphere tools** : Time Series API, Cloud Foundry, cfd cli
- And, our favourite, **Git**!

Prediction Accuracy : 97.8 %



Datasets given to us

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Business Utility and Applications

- Makes surgeries **painless**, hence improving **customer satisfaction**.
- **Reduces** the probability of doctors committing **accidental errors**, and hence **increasing reputation**
- **Highly cost-effective**, since it doesn't need any servers, or memory space. Everything is in **frontend**.
- **Easy to operate**. Hence, no special training required, even for amateurs.

Further Scope for Improvement

- **Personalised prediction** based on user's demography and past operation records (if any)
- **Reinforcement Learning (RL)** based models which responds dynamically to new data received on the go
- Incorporating larger and **more versatile datasets**
- **Real-time integration** with the sensors of acetabular reamer, with an efficient feed-back mechanism

Limitations

- Since its a machine learning model, outcome depends on **how large the datasets are**, and the **technology** used.
- Prone to errors for the situations of **unseen outliers**.

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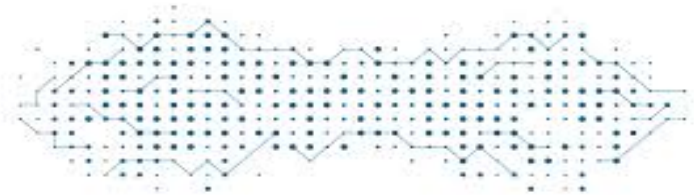

THANK YOU !!