

1. Background

- The National University Hospital (NUH) is a major tertiary healthcare institution in Singapore
- The Department of Orthopaedics in particular, is concerned about the increasingly longer outpatient wait times and infrequent availability of specialist orthopaedic care in Singapore's healthcare system

3. Objectives

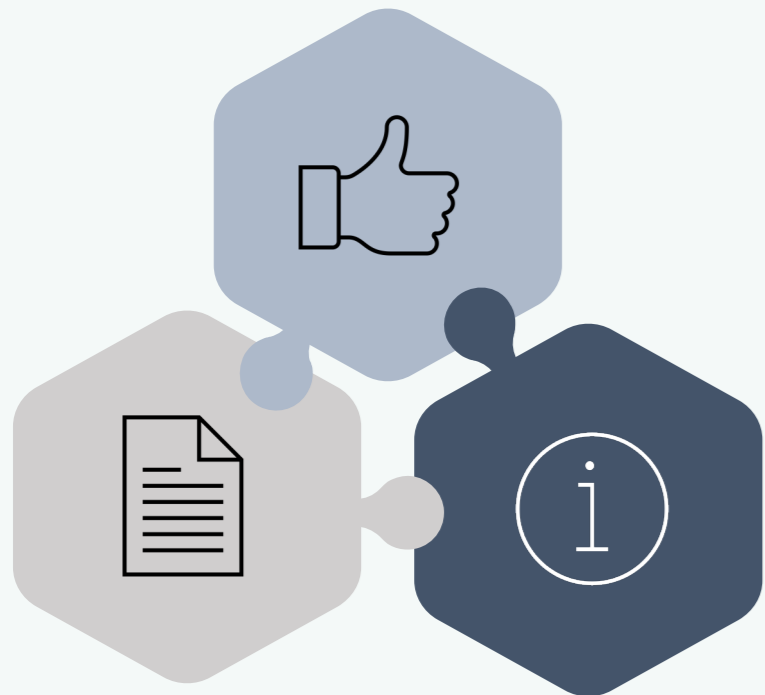
- Online web interfaces for **self-reporting** of symptoms by patients
- Make appropriate **classifications** based on self-reported symptoms
- Triage according to **priority** and **urgency** of patients

Conduct trials to evaluate the accuracy and consistency of classifications

4. Front-end Methodology

Web Interface Design Principles

Simple
Easy to understand, fill & complete accurately

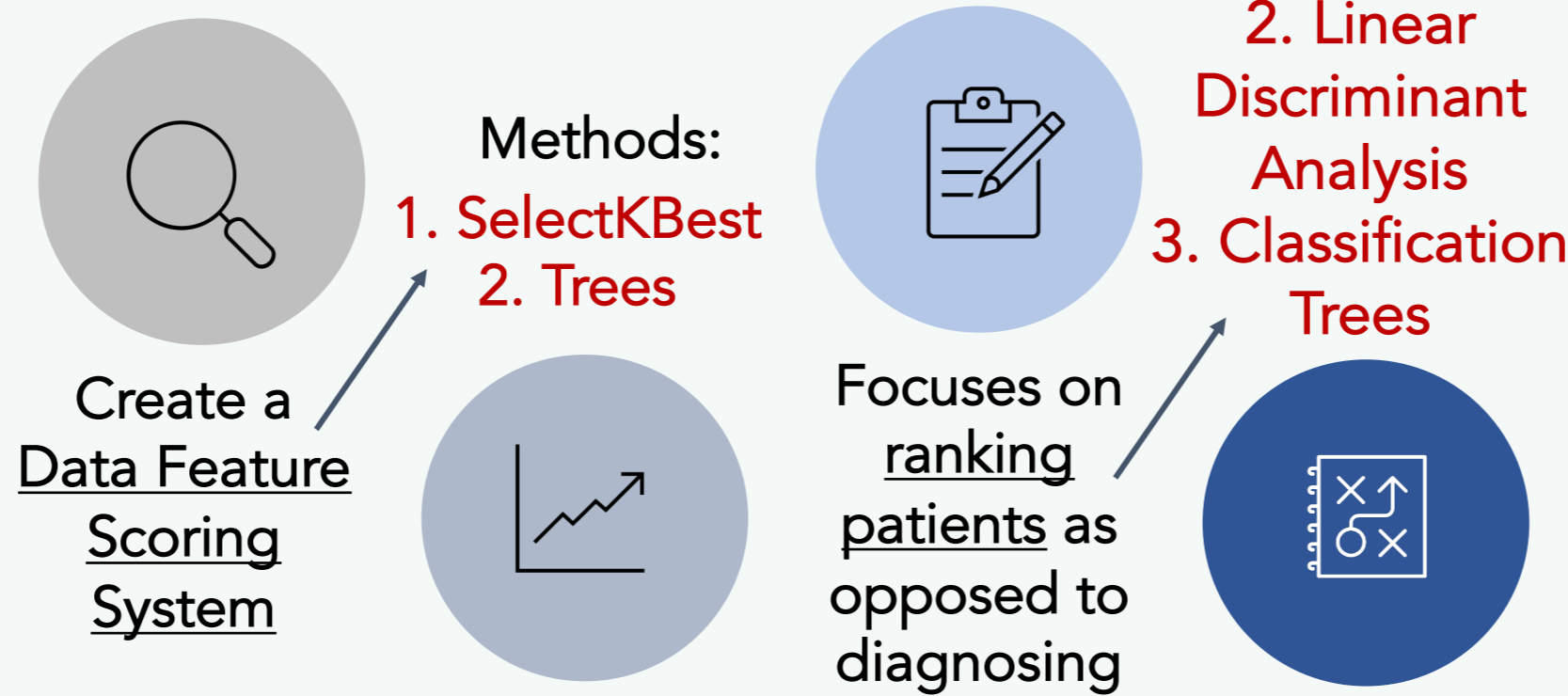


Comprehensive
Detailed list of questions to capture vital information for triaging purposes

Elder-Centric
Visual, audio & animated aids

5. Back-end Methodology

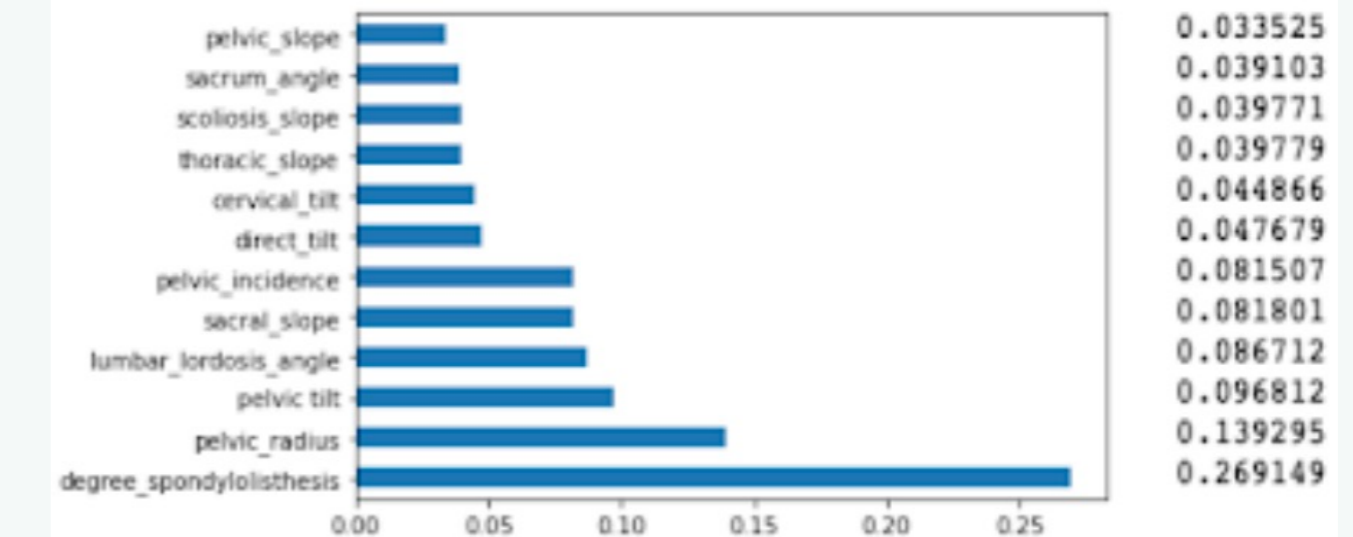
Machine Learning



6. Performance Analysis

Feature Scoring System

✓ Best model: Tree with Random Forest



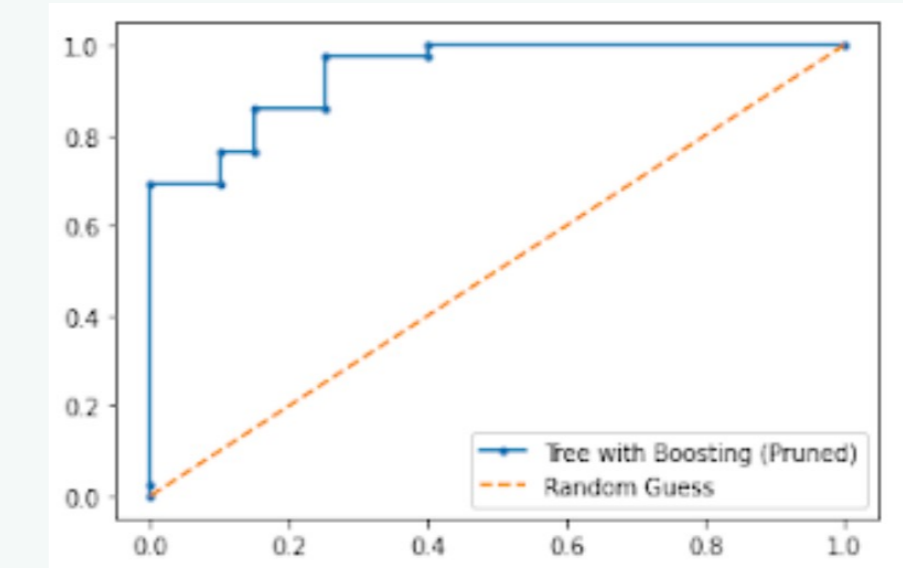
Accuracy Rate – 82.23%

Sensitivity – 90.48% which is comparable to the maximum of 92.85%

Does not dismiss minor features too quickly

Ranking Patients

✓ Best model: Boosted Tree



ROC Score – 0.839

		Actual Observation		
		Non-Null (Abnormal)	Null (Normal)	Total
Predicted	Non-Null (Abnormal)	39	5	44
	Null (Normal)	3	15	18
Total		42	20	
Accuracy	87.10%	Sensitivity : 92.85%	Specificity: 75%	

Accuracy Rate – 87.09%

Sensitivity – 92.85%

7. Deliverables

1. Front-end User Interfaces

Spine Form

- ✓ Based on current Spine Template
- ✓ 2 Versions (Doctor and Patient)
- ✓ Patient Version – Less comprehensive and uses layman terms
- ✓ Doctor Version – Captures highly technical data only obtainable through patient examinations
- ✓ User Centric Design – Textual, Visual & Audio Aid

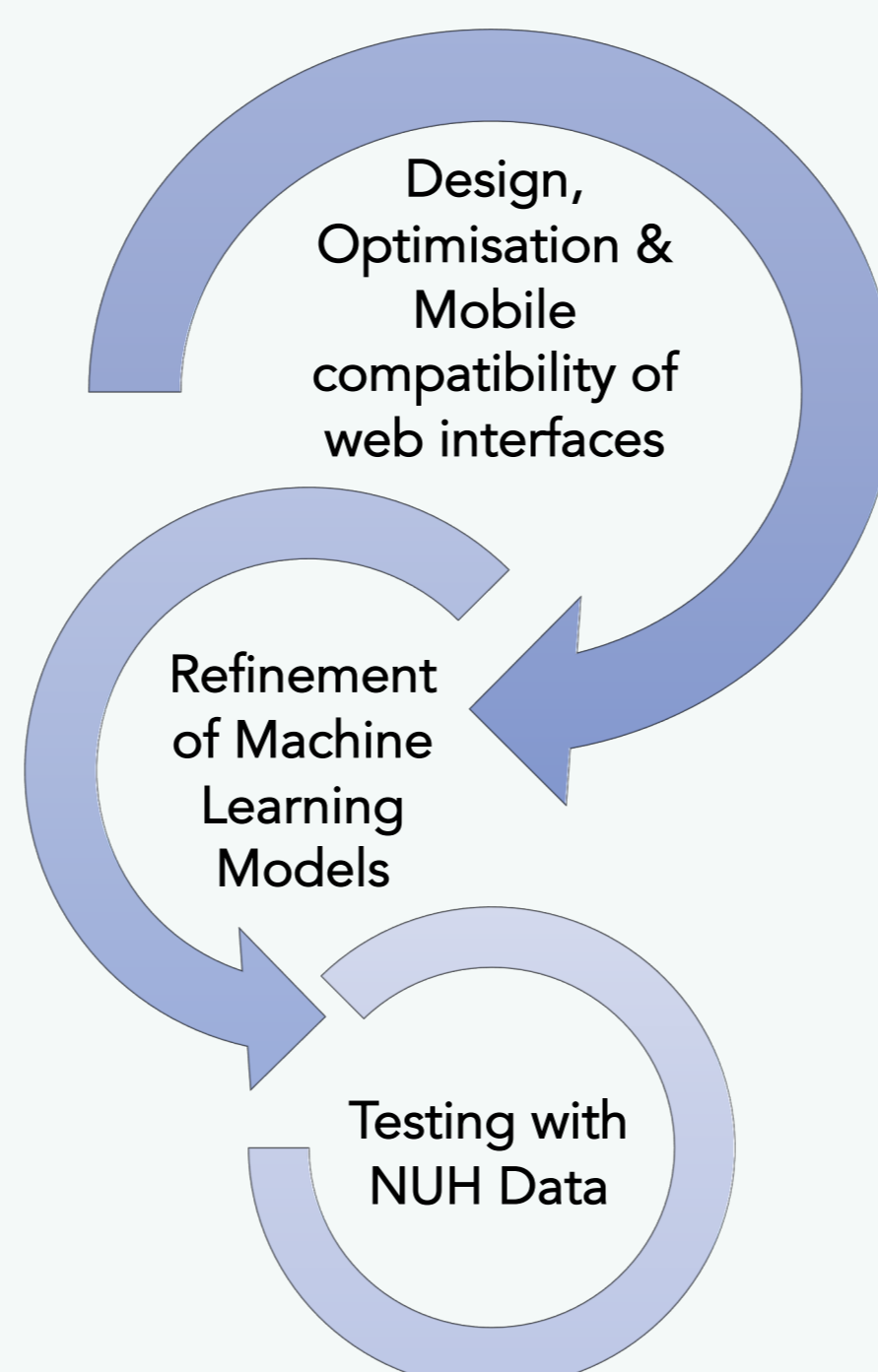
2. Back-end

- Flask Application Programming Interface (API)
 - Collect, process and store data
- Postgres SQL Database
 - Secure storage of patient & medical records
 - Easy access of data for data analytics
- Scoring & Triaging
 - Utilize Machine Learning to score patients by urgency

Outcome Survey

- ✓ Collection of 5 questionnaires
- ✓ Indicator of patient's medical status
- ✓ Done before and after surgery to gauge the quality and effectiveness of care

8. Future Developments



9. Conclusion

ISE Skill-sets applied:



Skill-sets acquired:

