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PERFORMANCE IMPROVEMENT IN DATA INTEGRATION OF WEB INTERACTIVE CLINICAL INFORMATICS TOWARDS PRECISION MEDICINE

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Abstract: *Data integration in medical health care information collections plays the vital role in efficient Precision medicine in the field of medical technology. The web interactive clinical informatics provides the collected medical data for any particular medical issues from anywhere among the world in an efficient manner. Since the medical data collection is from various different format resources, the integration with corresponding component match produces the final output in desired format which is a complexity one to implement in real time data handling procedures. The process of improving the integrated results for producing the exact medical reports resembles the efficiency in precision medicine system domain. This paper proposed the performance improvement of integrated web interactive clinical informatics towards precision medicine with evaluation techniques using data mining strategies by frequent monitoring and evaluation for individual patient condition. In future this paper will be extended with neural networks based analysis of implementation through machine learning techniques to attain an intelligent precision medicinal system.*

Index Terms: Precision, Medicine, Interaction, Clinical informatics, Integration

I.INTRODUCTION:

The overview of the clinical information system[11] consists clinical care[1] ,health system[5] and information technology[7]. The clinical care focuses on the medical component sub systems[2]. Health system consists of experts and equipment sub systems [5]. Information system consists of data handling sub systems [9,10].

Web Data Interactions are generated when a user creates an interaction between any analytic content and other analytic content (query to query) [3]. Data interactions involve changing the target query with input from the source item. By default, all interactions between queries are assumed to involve data interactivity - which will be enabled unless verbosely turned off [4, 6].

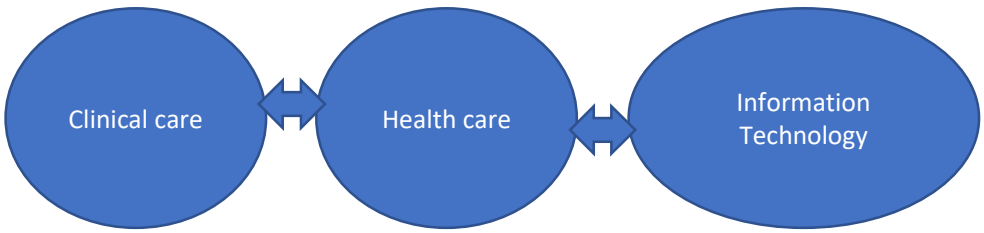

Fig-1: Clinical Informatics Overview

Problem Statement and Objective:

The process of improvement in the data integrated precision medicine state is a complex one which requires combinatorial procedural approach with collected medical data integrated information's incorporated by proper verification and validation for further medical health care improvements.

The objective of this work is to perform the effective data integration performance from Web data Informatics from heterogeneous medical data resources through several clinical informatics web resources.

II.PROPOSED METHODOLOGY:

The proposed methodology focuses on implementing the performance improvement of integrated clinical informatics from different web data informatics with proper verification and validation. The 5-dimensional methodology which includes genuine check, API support, Real-time access, FHIR standard and analytic function for performance integration of medical data with proper verification and validation in the field of information technology plays the important role in precision medicine for the optimal gain in the clinical informatics improvements system. The following figure-1 shows the proposed methodology structure,

Performance Improvement for Medical Data Integration in Precision Medicine

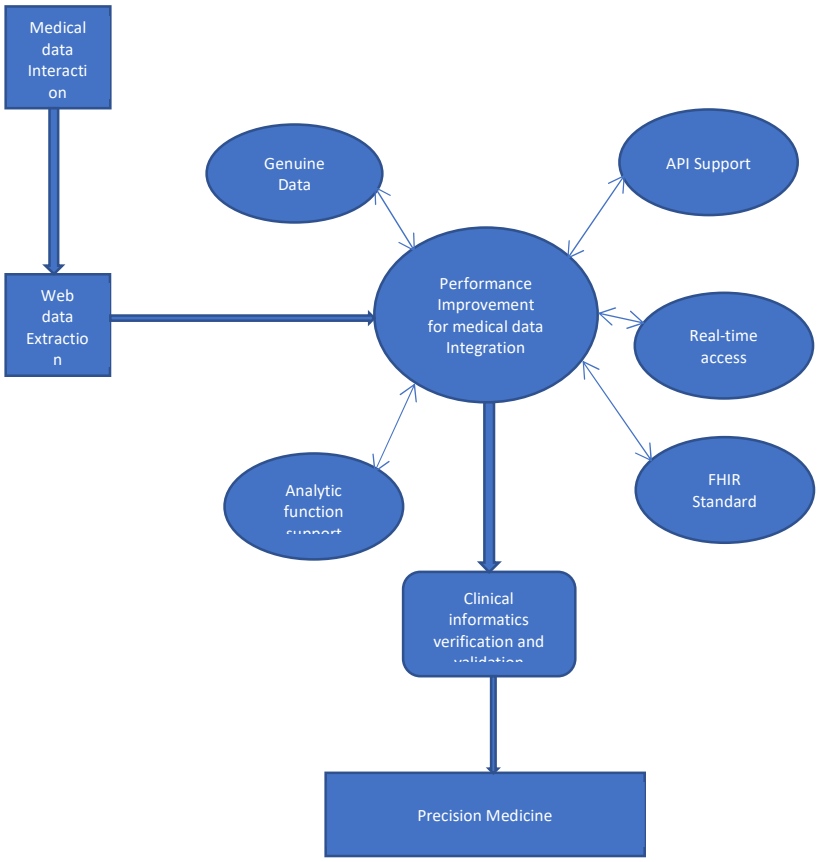

Fig-2: Proposed Performance Improvement of integrated Clinical informatics system for Precision medicine.

III. IMPLEMENTATION:

a. Medical data interaction

Medical data interaction is a proposed 4-Dimensional data from each medical resources uniquely represented by 24 character data id such that,
3 alpha numeric characters for Gender and Human part,
3 alpha numeric characters for disease code,
2 alpha numeric characters for country,
3 alpha numeric characters for hospital code,
3 alpha numeric characters for Medical expert handler ID,
7 alpha numeric characters for Patient ID,

For example MLKSS8INXXXDDDabcd123
Where
MLK represents Male with Left Kidney issues
SS8 represents Stone Size of 8 mm
IN represents India
XXX represents the Hospital code
DDD represents Doctors code
Abcd123 represents the patient ID.

The following table-1 illustrates the 4-Dimensional Medical data Resource.

Table-1: Proposed 4-Dimensional Medical data resource of interactions.

Medical data Id: MLKSS8INXXXDDDabcd123

Hospital data interaction	**Patient data interaction**
Text/scanned data files	Text/audio/video data
Lab data interaction	**Medical expert interaction**
Text/Graphics/Opinion formats	Text/audio/video/Graphics

b. Web data extraction.

The extraction of multimedia information's other than texts are through normal file transfers but it is different for the text information extractions due to the non-uniform editors. The java program to extract universal medical data code or web medical text data extraction for any text editors used for storage by different web medical resources are as follows,

```
public class Richardpro {
   public static void main(String[] args12) throws Exception
  {
     String pathx1 = System.getProperty("medicalx11.dir");
```

```
        Path1 = pathx1 + File.separator + "medicalfilex11.ext";
        FileInputStream finx1 = new FileInputStream(pathx1);
        XWPFDocument documentx1 = new XWPFDocument(finx1);
        List<XWPFParagraph> paragraphs1
           = documenx1t.getParagraphs();
         for (XWPFParagraph parax1 : paragraphs1) {
           System.out.println(parax1.getText() + "\n");
        }
          }
}
```

C. Performance Improvement for medical data Integration

The 5-dimensional methodology which includes
1. Genuine check,
2. API support,
3. Real-time access,
4. FHIR standard and
5. Analytic function.

The architectural design is as represented in Fig.3

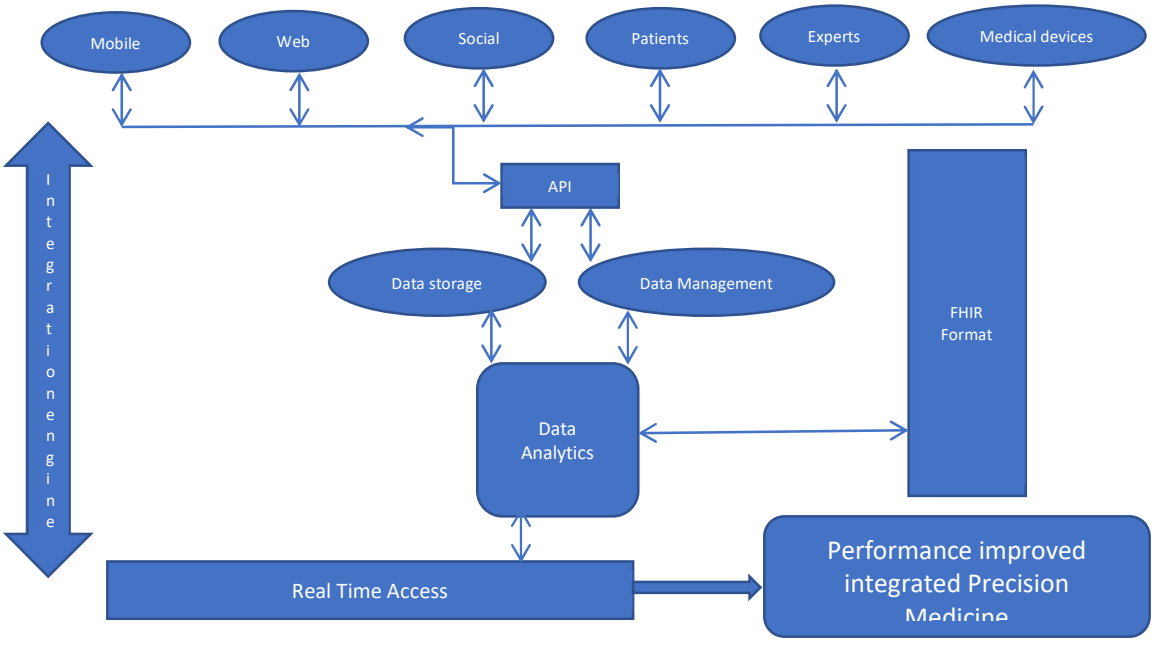

Fig.3: Architectural design for Performance improvement in medical data integration

1. Genuine Check:

The structured or unstructured integrated medical data is of importance based on its genuine nature, it depends on the following factors:

Loopback Verification for Source System:

The loop back verification method checks with the original available data sources.

Systematic Source-To-Source Verification:

SQL based validation for source to source comparison checking procedures.

Tracking all the data issues:

This technique focuses on redundancy, inaccurate data, duplication, and incomplete information.

2. Application Programming Interface Support:

It focuses on the connection of data, platform and services.

- ✓ API creation by self or from library.
- ✓ Connect API to ERP software's updating status.
- ✓ API data mapping to other formats.
- ✓ QuickBooks, Xero, and others application synchronization.
- ✓ Third party app synchronization.

3. Real time access:

It is an online tabulation tool for the subscribers to run SAS programs in order to extract tables from the master subset files as a result.

4. FHIR standard:

The sample XML code for FHIR incorporation is as follows,

```
{
 "resource Type": "Bundle",
 "id": "bundle-example",
 "meta": {
  "lastUpdated": "2022-08-18",
  "tag": [
   {
    "system": "http://victor3-ActReason",
    "code": "HTEST",
    "display": "test health data"
   }
  ]
 },
 "type": "searchset",
 "total": 3,
 "link": [
  {
   "relation": "self",
   "url": "https://spvictor.com"
  },
  {
   "relation": "next",
   "url": "https://spvictor.com"
  }
 ],
 "entry": [
```

```
  {
   "fullUrl": "https://spvictor.com",
   "resource": {
    "resourceType": "MedicationRequest",
    "id": "3123",
    "text": {
     "status": "generated",
     "div": "xmlns\09d "
    },
    "status": "unknown",
    "intent": "order",
    "medicationReference": {
     "reference": "Medication/example"
    },
    "subject": {
     "reference": "Patient/123"
    }
   },
   "search": {
    "mode": "match",
    "score": 1
   }
  },
  {
   "fullUrl": "https://spvictor.com",
   "resource": {
    "resourceType": "Medication",
    "id": "example",
    "text": {
     "status": "generated",
     "div": "\*.* "
    }
   },
   "search": {
    "mode": "include"
   }   }
 ]
}
```


5. Analytic function

Google Analytics and Google DoubleClick Manager are sued to perform data nalytcis for the integrated medical data storeage in efficient research analysis strutures.

d. Clinical informatics verification.

The verification completion is done through the medical data extraction with proper data integration.

1. Speed.
2. Accuracy.
3. Cost.
4. Equity.
5. Emergency access and
6. Health Management

e. Precision Medicine with Improved Integration Performance Efficiency

The optimal data integrated collection are put together and implemented with the efficient treatment for the similar diseases. The proper monitor and evaluation system produced the following results in table-3.

Table-3: Sample Precision medicine solution for Health improvements values.

Sl.No	**Health issues**	**Normal isolated approach in days**	**Improved Integration Performance Efficiency based precision medicine approach in days**
1	Covid	18	3
2	Kidney Stones	12	1
3	Gallbladder malfunction	10	2
4	Color blindness.	7	1
5	Type-1 Diabetes	30	2

The following figure shows the performance of the optimal data extraction for the integrated clinical informatics towards precise medicine.

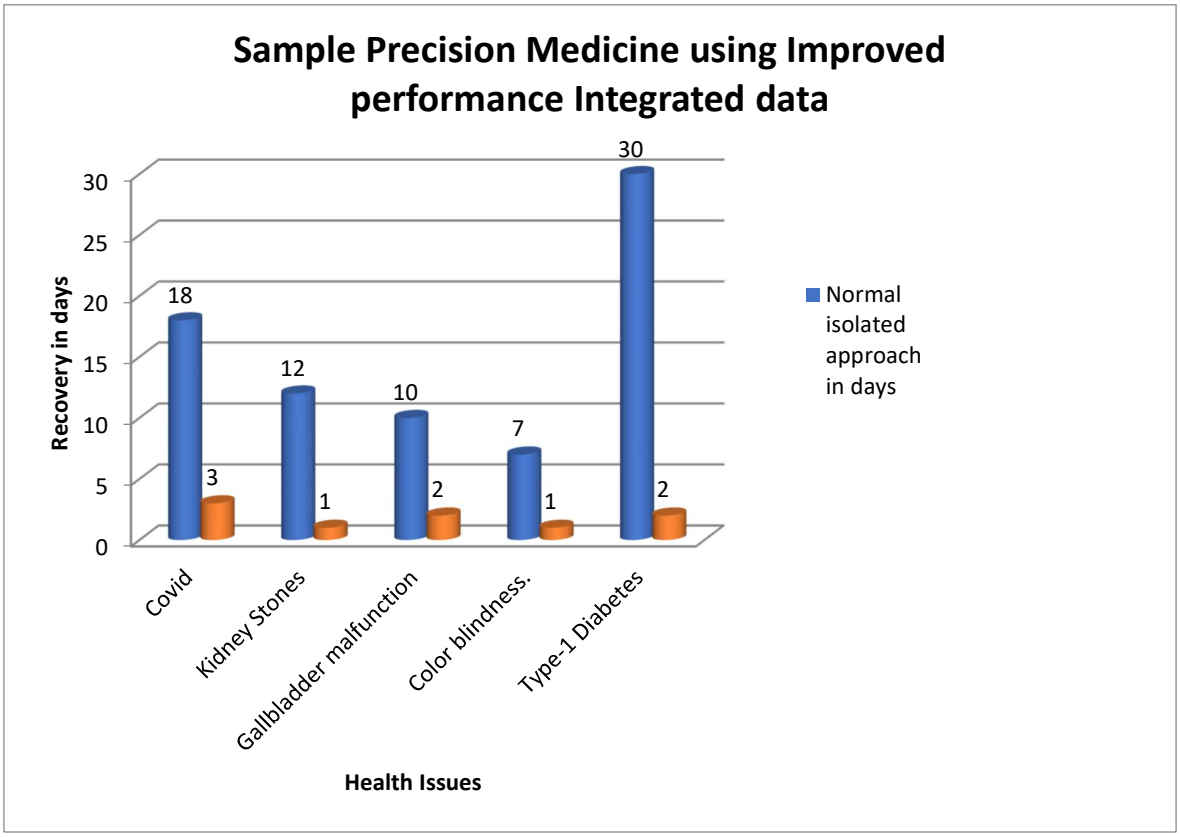

Fig.4: Sample Precision medicine solution for Performance improvement values

IV.RESULTS AND DISCUSSION

The results of Covid-19 Omicron Variant in India is used for the implementation of the proposed schema with respect to a minimal restricted data collection of 50 cases within a fortnight in table-4 is as follows,

Table-4: Proposed Model results for covid-19 Clinical informatics using precision medicine

Category	Covid-19 recovery	Covid-19 active count
Total Cases	0	75
Proposed Performance Improvement based integration results from Tamilnadu state	40	35
Proposed Performance Improvement based integration results from other states	25	10
Proposed Performance Improvement based integration results from Asia	8	2

Proposed Performance Improvement based integration results from Overseas.	2	0

The following figure shows the results obtained for the optimal implementation of web data integrated clinical informatics for precision medicine is as follows.

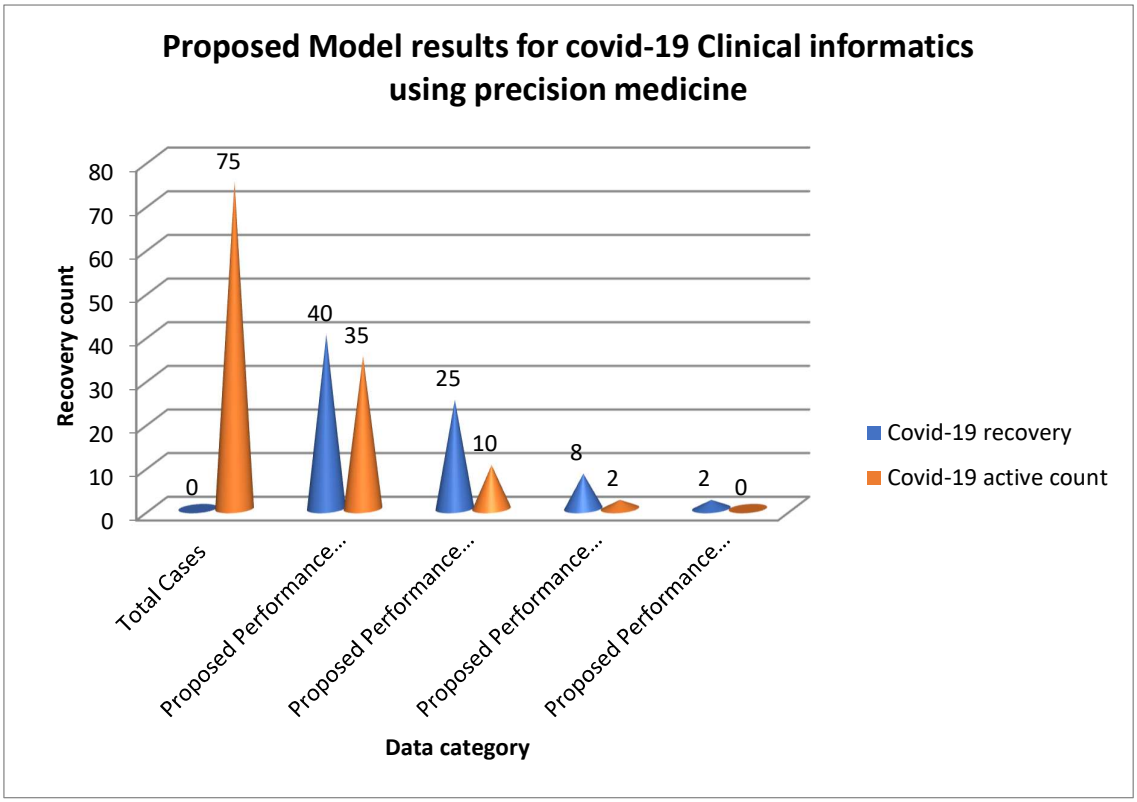

Fig.5: Proposed Model results for covid-19 in Clinical informatics for precision medicine

The final results show the 87% success due to the 65 count reduction based on shared performance integrated data of clinical informatics for the precision medicine.

V.CONCLUSION

The medical data resource information from multiple medical data points throughout the world with focusing on the common beneficiary of fast curing in every client or patient aspects are important throughout the medical world. The process of integrating the medical data with the improved performance of data retrievals in clinical informatics from different level of medical information's is useful in solving the medical issues and improves the healthier environment. This research paper initially focuses on the collection of web medical data interactions from the hospitals, patients, doctors and labs in the form of different data types. The data integration plays the important role with genuine data handling, API support, real time access, FHIR format and analytic function implementation is the secondary objective of this research work. The final part of the research verifies and validates the uniqueness for identifying the similar patient cases with the efficient performance integration for the precision medicine. Our

proposed methodology provides 87% success rate for the medical support efficiency. In future this research will be extended with the implementation of neural networks for the effective automated precision medicinal system.

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