Voice Controlled Personal Assistant Device and Controlling IOT Devices

Kapish Kaith	**13CO028**
Rohan Killedar	**13CO032**
Chaitanya Kulkarni	**13CO033**
Abhay Dekate	**13CO401**

AISSMS, College Of Engineering
Department Of Computer Engineering

Savitribai Phule University Of Pune

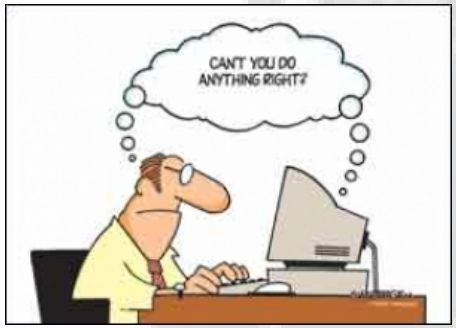
Guided By: Prof. Nitin R. Talhar

October 11, 2016

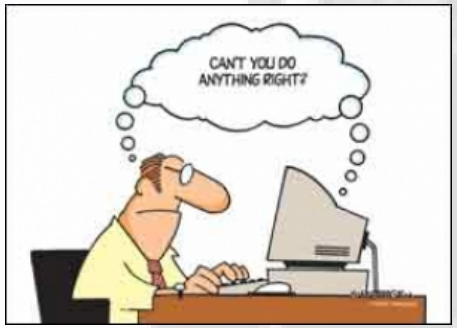
Overview

What's The Problem

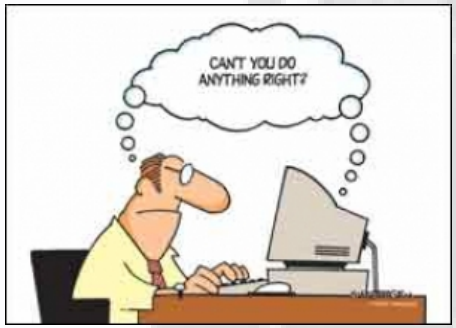
What's The Problem

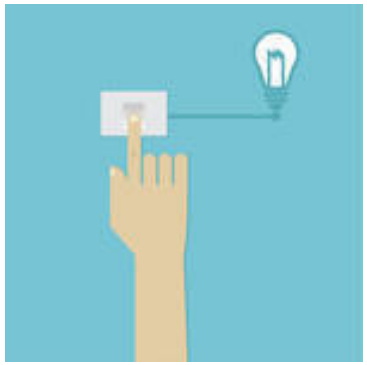


What's The Problem

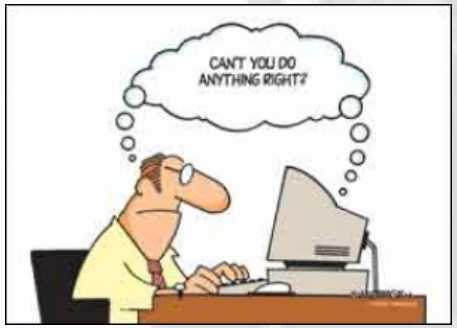


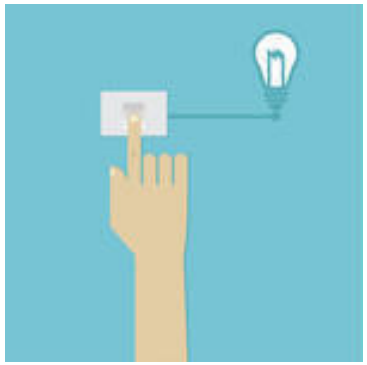
What's The Problem



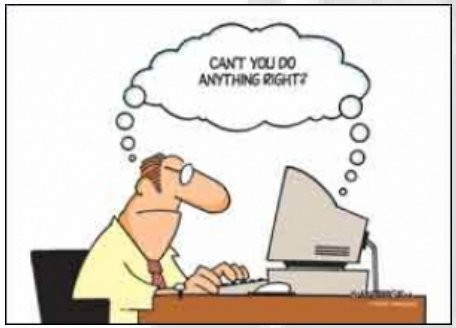


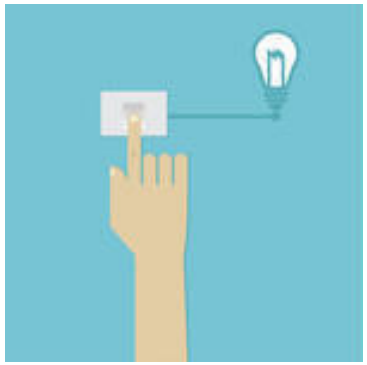
What's The Problem



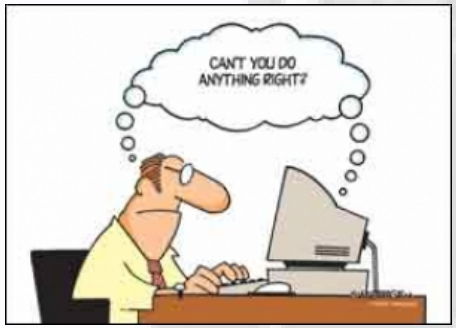


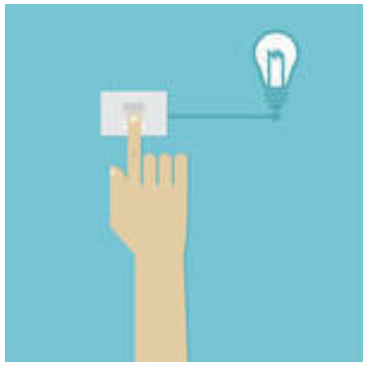
What's The Problem



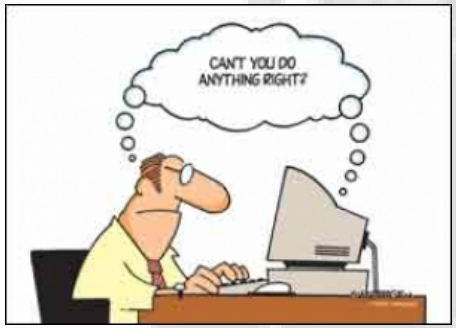


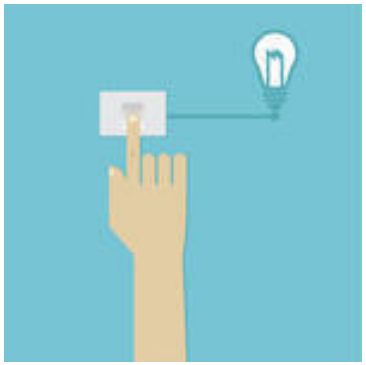
What's The Problem

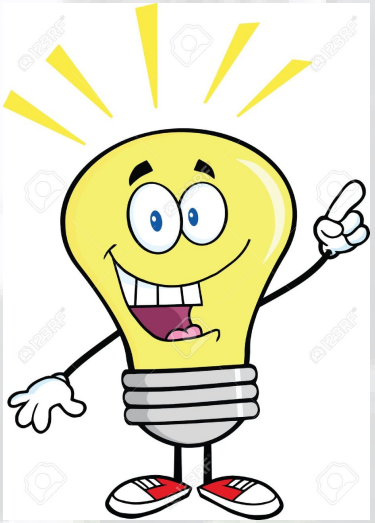




What's The Problem

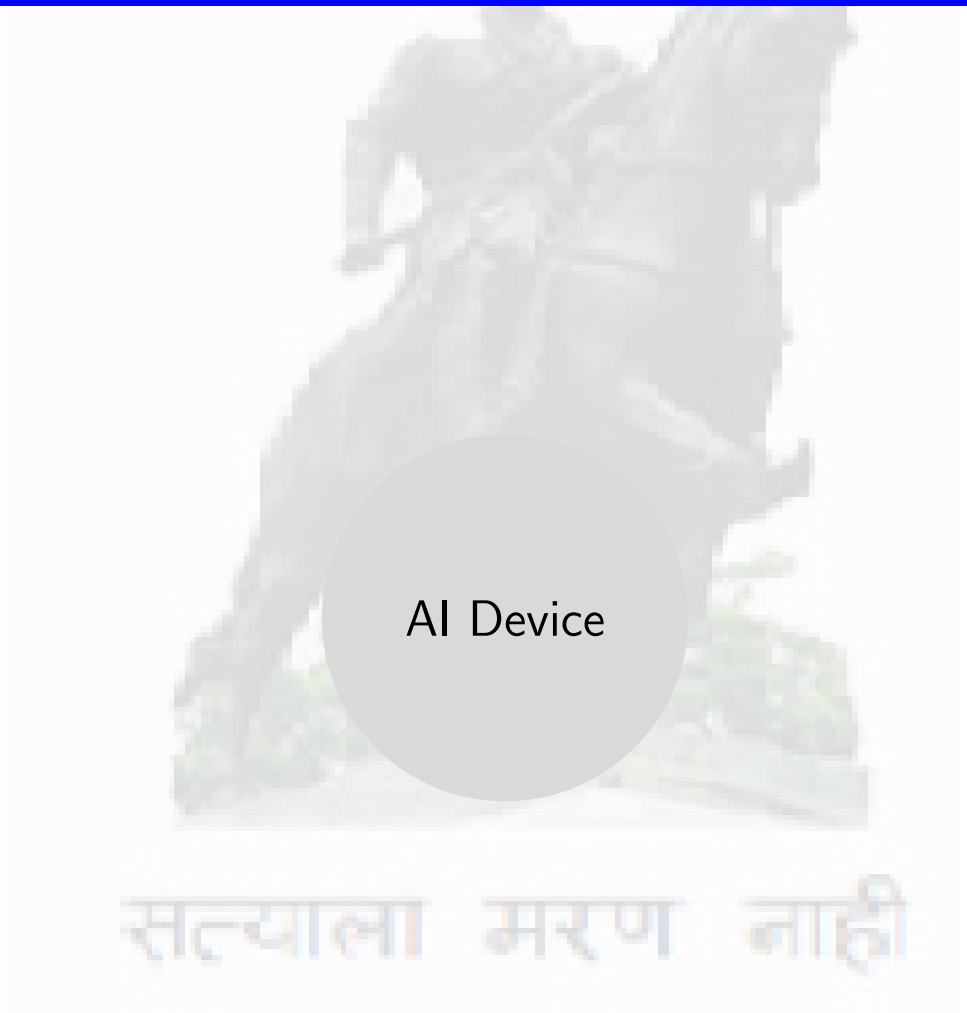




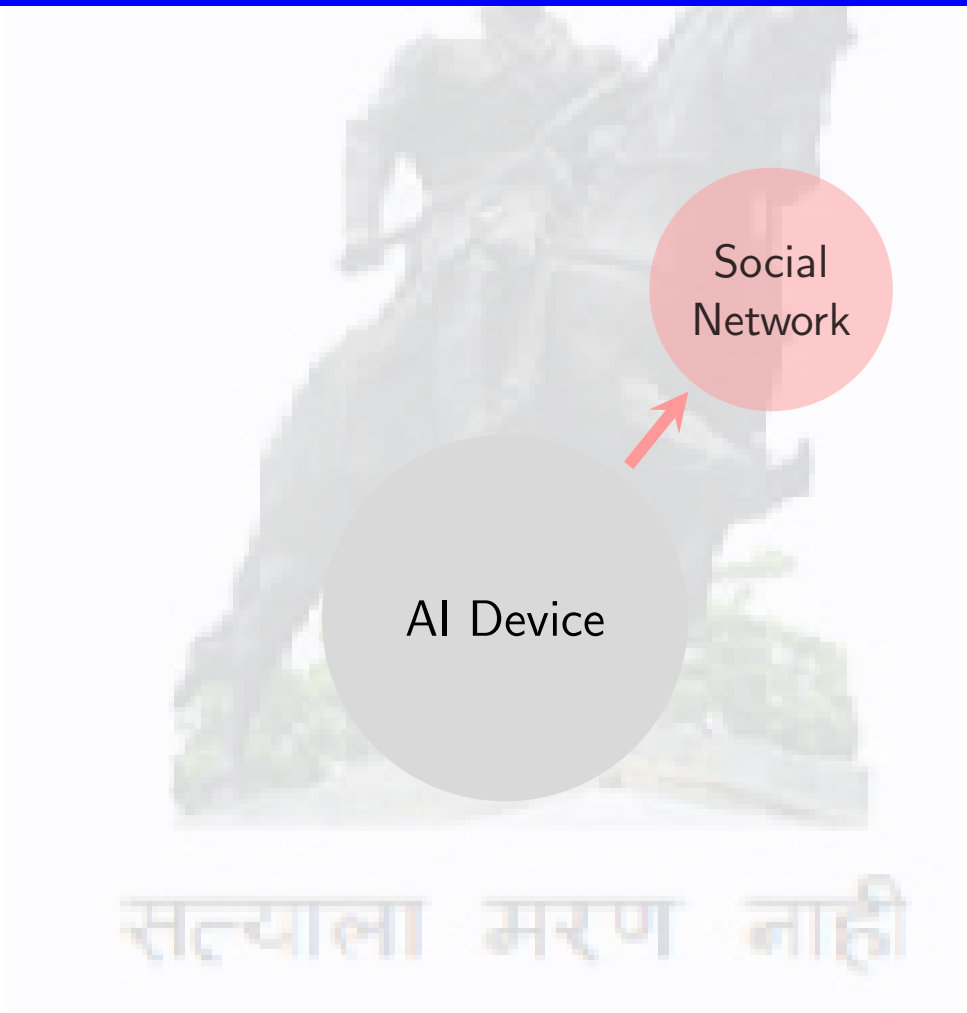


What if we could have one solution to all these problems?

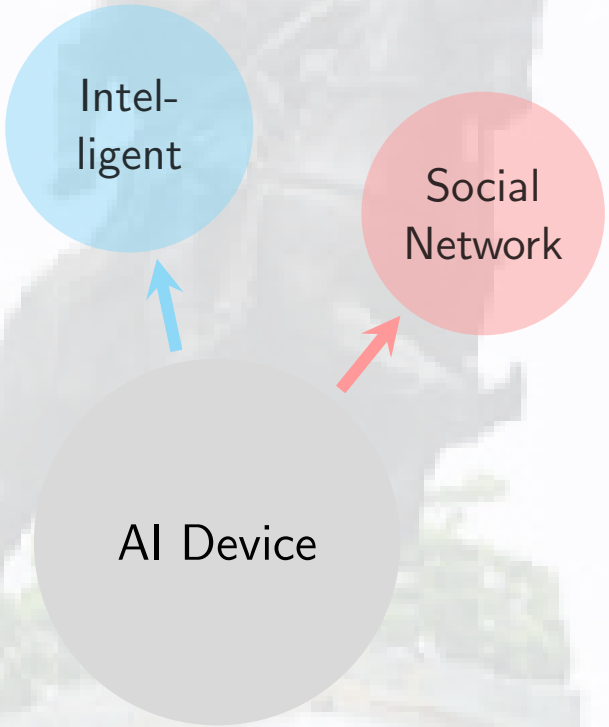
Motivation



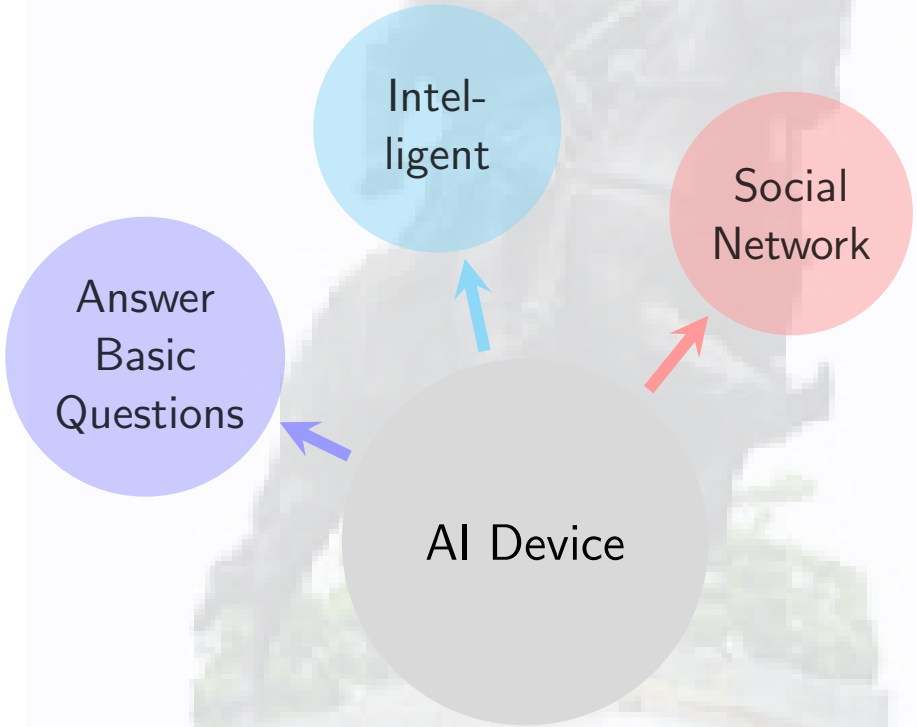
Motivation



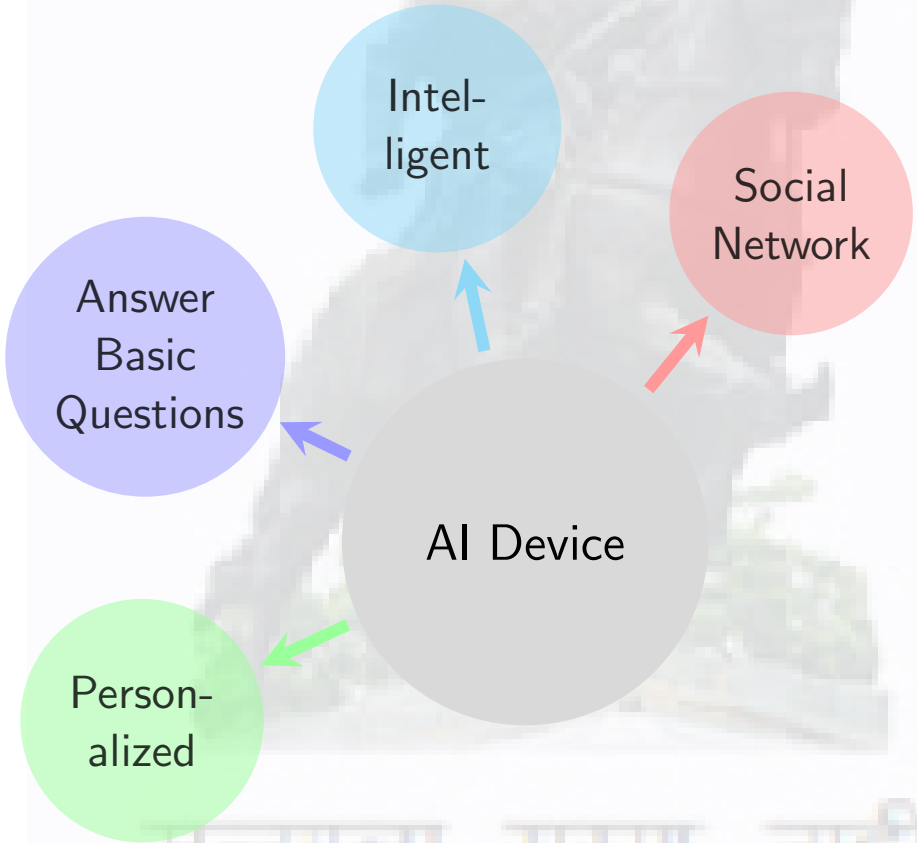
Motivation



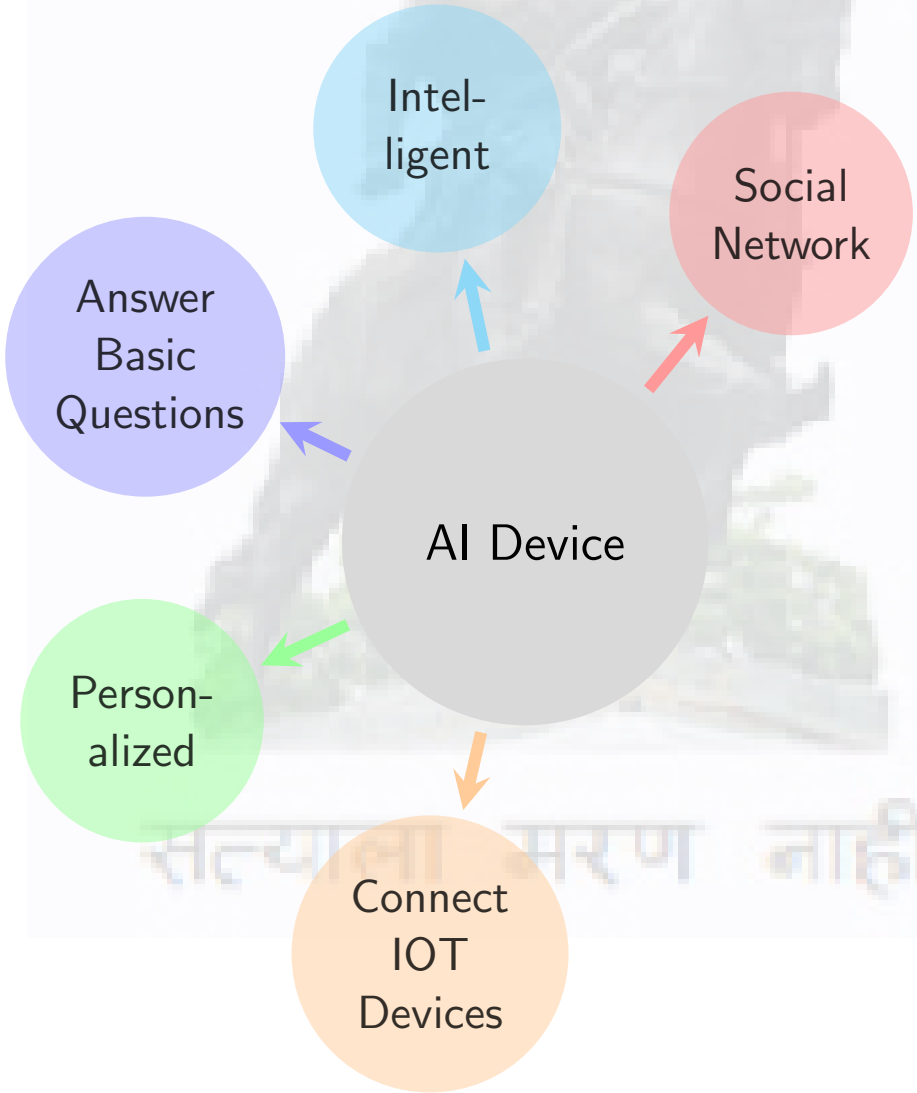
Motivation


Intel-
ligent
Social
Network
Answer
Basic
Questions
AI Device

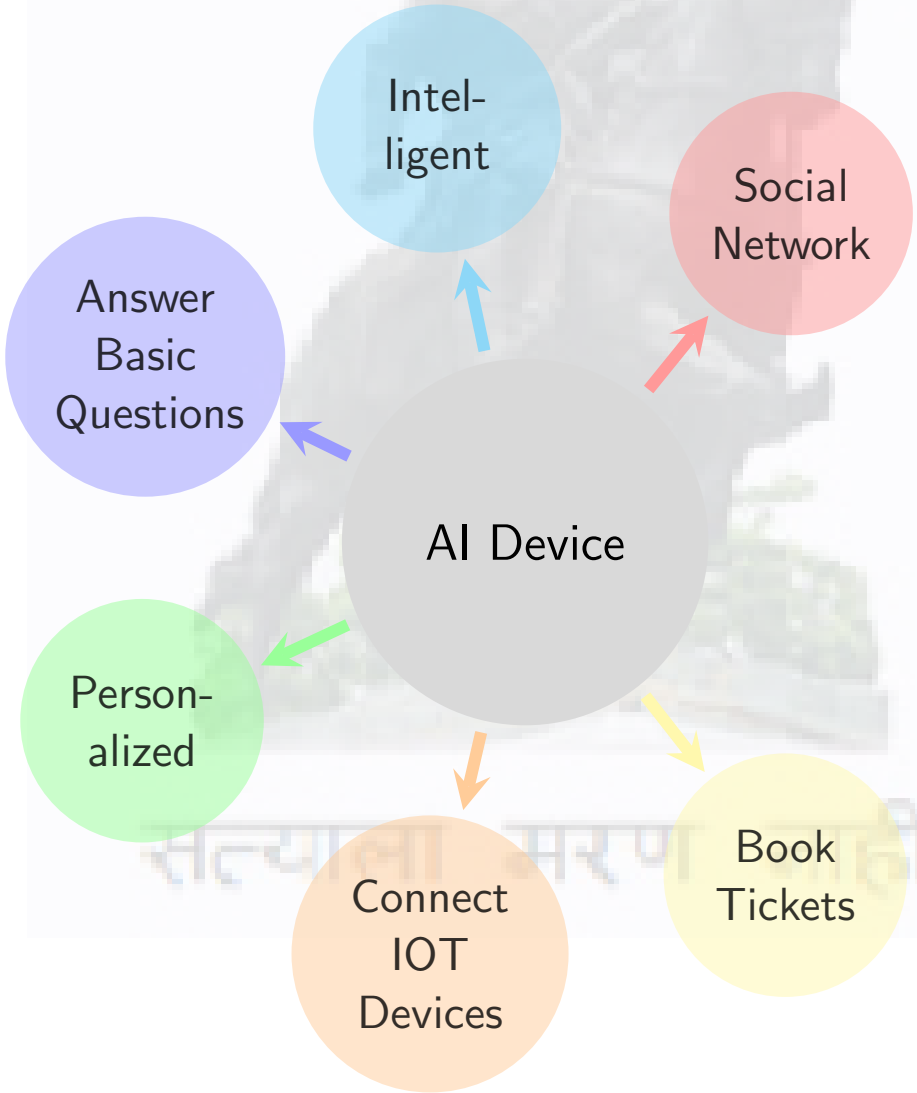
Motivation


Intel-
ligent
Social
Network
Answer
Basic
Questions
AI Device
Person-
alized

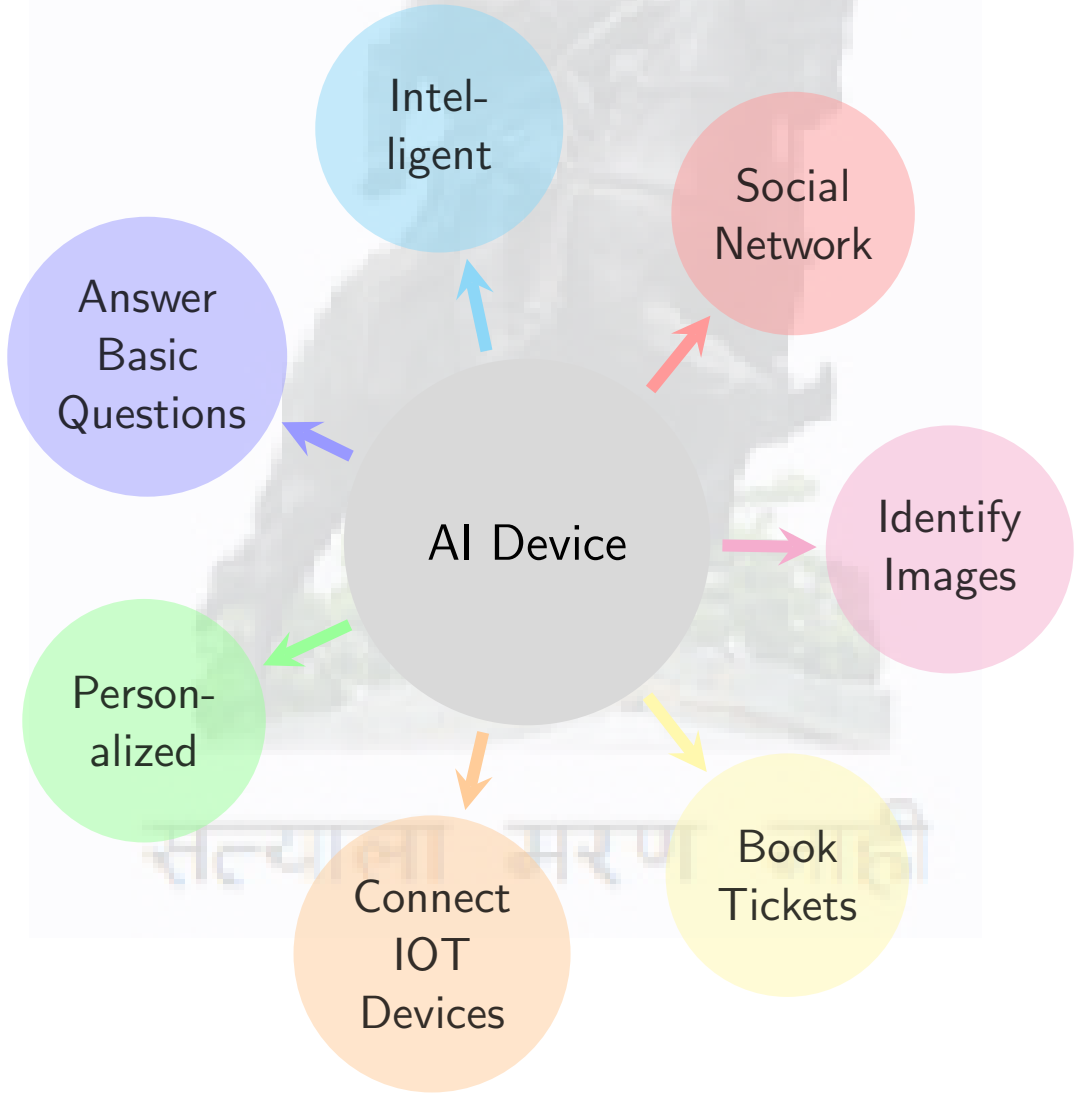
Motivation


Intel-
ligent
Social
Network
Answer
Basic
Questions
AI Device
Person-
alized
Connect
IOT
Devices

Motivation


Intel-
ligent
Social
Network
Answer
Basic
Questions
AI Device
Person-
alized
Book
Tickets
Connect
IOT
Devices

Motivation


Intel-
ligent
Social
Network
Answer
Basic
Questions
AI Device
Identify
Images
Person-
alized
Book
Tickets
Connect
IOT
Devices

Problem Statement

Statement

- To build a Personalised Intelligent Assistant Device that can help humans with the basic task of day to day regimen using their voice.
- Also to ease the interface of the IOT devices in the surrounding of the Intelligent Device.

Google v/s Apache Solr v/s ElasticSearch

Google	Apache Solr	Xapian
Web Search Engine	Full Text Search Engine	Full Text Search Engine
Uses Page Rank for prioritizing	Supports HTTP,XML,JSON	Binding with python,Ruby,Java
Stores Location information	Spatial Search Available	No Spatial related Search
Not Open Source	Open Source	Open Source
Seperates Bold and Larger text from normal	Multi-lingual and synonym Search	Accurate probabilistic Ranking
Overuses algorithm, hence fails in medical searches	Slow Startups and Commits	Slow Search due to log search
Most used Search engine in WWW	Used by Twitter, LinkedIn, etc.	Debian, Gmane, Die Ziet

So finally we came up with..!!!

So finally we came up with..!!!

So finally we came up with..!!!

And we call it

So finally we came up with..!!!

And we call it "JASPER"

What is Jasper?

Introduction

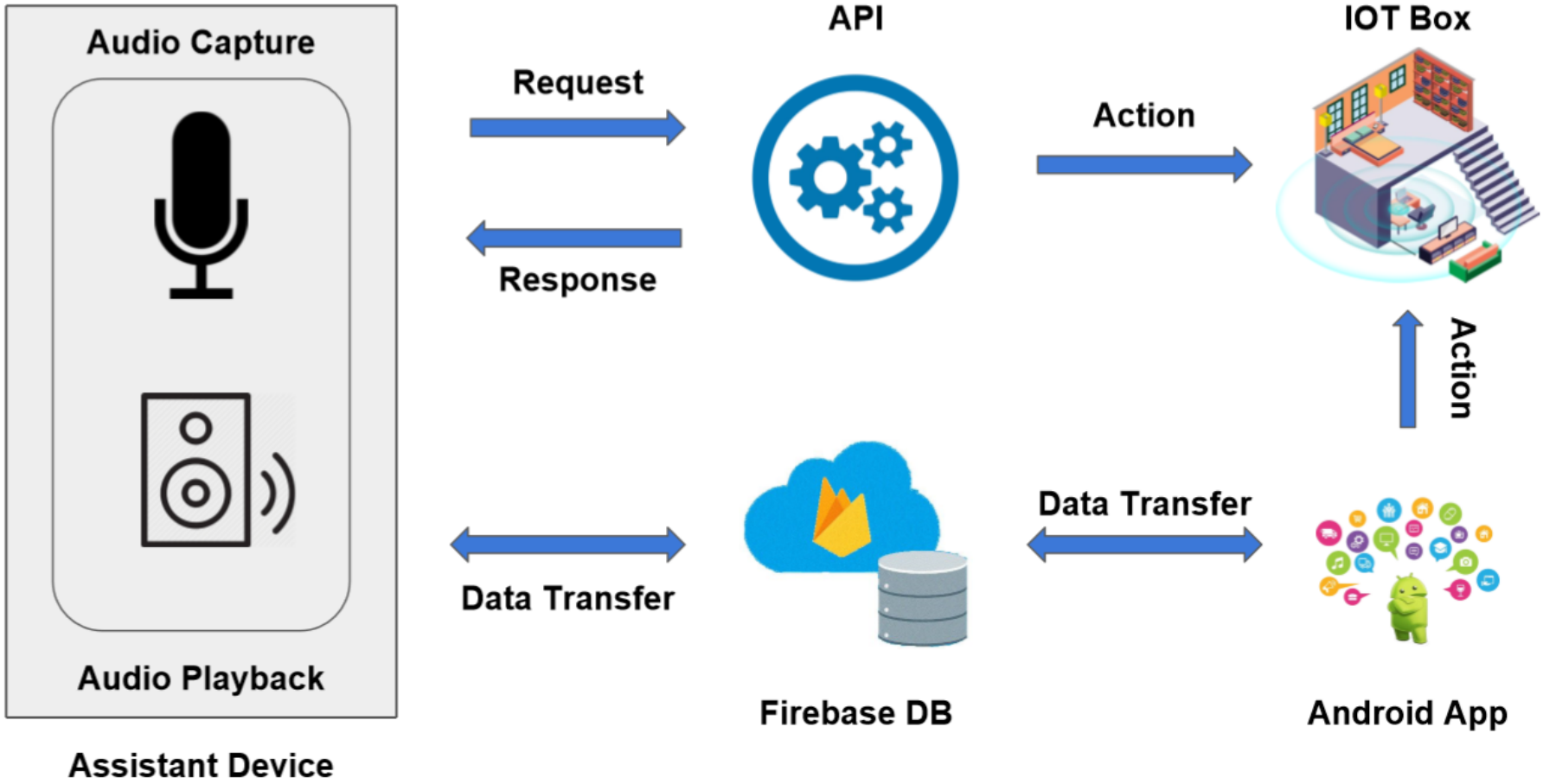
- An open source Voice controlled personal assistant device.
- Written in Python.
- Built on top of Pocketsphinx STT and espeak TTS.
- A standalone intelligent device which can perform basic tasks like Web search, Book Tickets, Integrate mails and many more.
- Can connect the IOT devices in the vicinity and control them with built-in voice commands.
- Connects with a Android app to personalize and control the functionality of the device.

Why use Jasper?

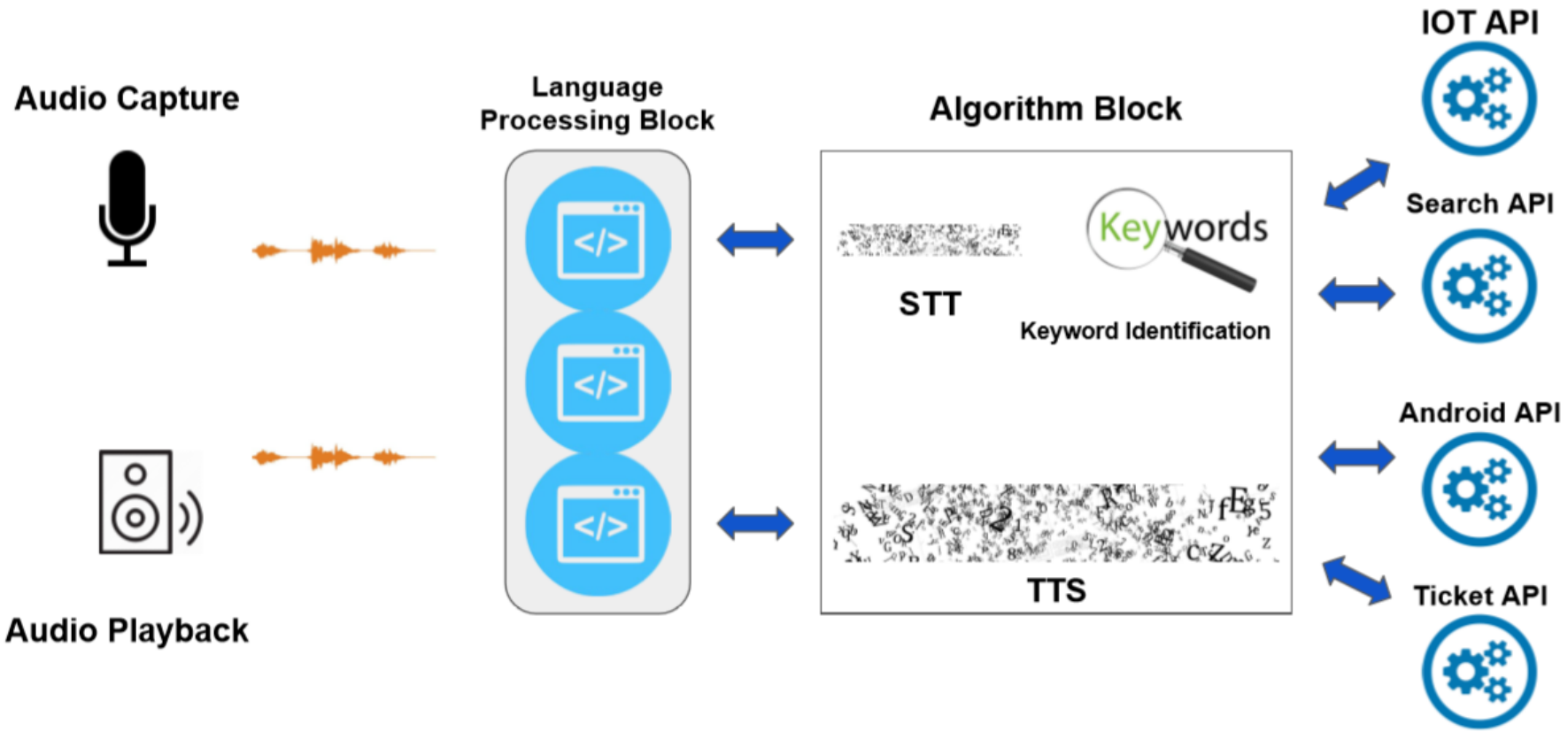
Features

- Replace the need of having different devices and application for different task performing.
- Open to community.
- Skill sets can be extended.
- Ease of use through voice commands.
- Can be personalized.
- Integrated Android Application.
- Can interface with IOT devices in the vicinity seamlessly.

Flow Diagram



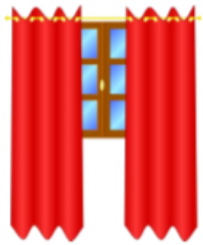
AI Device Flow Diagram



IOT Box Flow Diagram

AI Device

WIFI Connection



Drapes Control

Lights Control

LCD Control

Android App Flow Diagram

```
» curl –X GET localhost:9200/books/book/1
» curl –X GET localhost:9200/books/book/1/_source
```

Algorithm

The most prominently used algorithms in ElasticSearch are as follows:

Algorithms

- Relevance Scoring
- Inverted Index
- Zen Discovery

Relevance Scoring

ElasticSearch uses following theories for practical scoring to calculate relevance:

Boolean Model

The boolean model simply applies the AND,OR and NOT conditions expressed in the query to find all the documents that match.

```
full AND text AND(elasticsearch OR Lucene)
```

Term Frequency/ Inverse Document Frequency

- **TF**: How often the term appears in the document? More often, Higher the weight.
- **IDF**:
  - How often the term appear in all the documents in the collection? More often, lower the weight.
  - How long is field? Shorter the field, Higher the weight.

Inverted Index

ElasticSearch uses Inverted Index for fast full text-searchs.Let us consider two documents containing respective unique fields:

1. The quick brown fox jumped over the lazy dog.
2. Quick brown foxes leap over lazy dogs in summer.

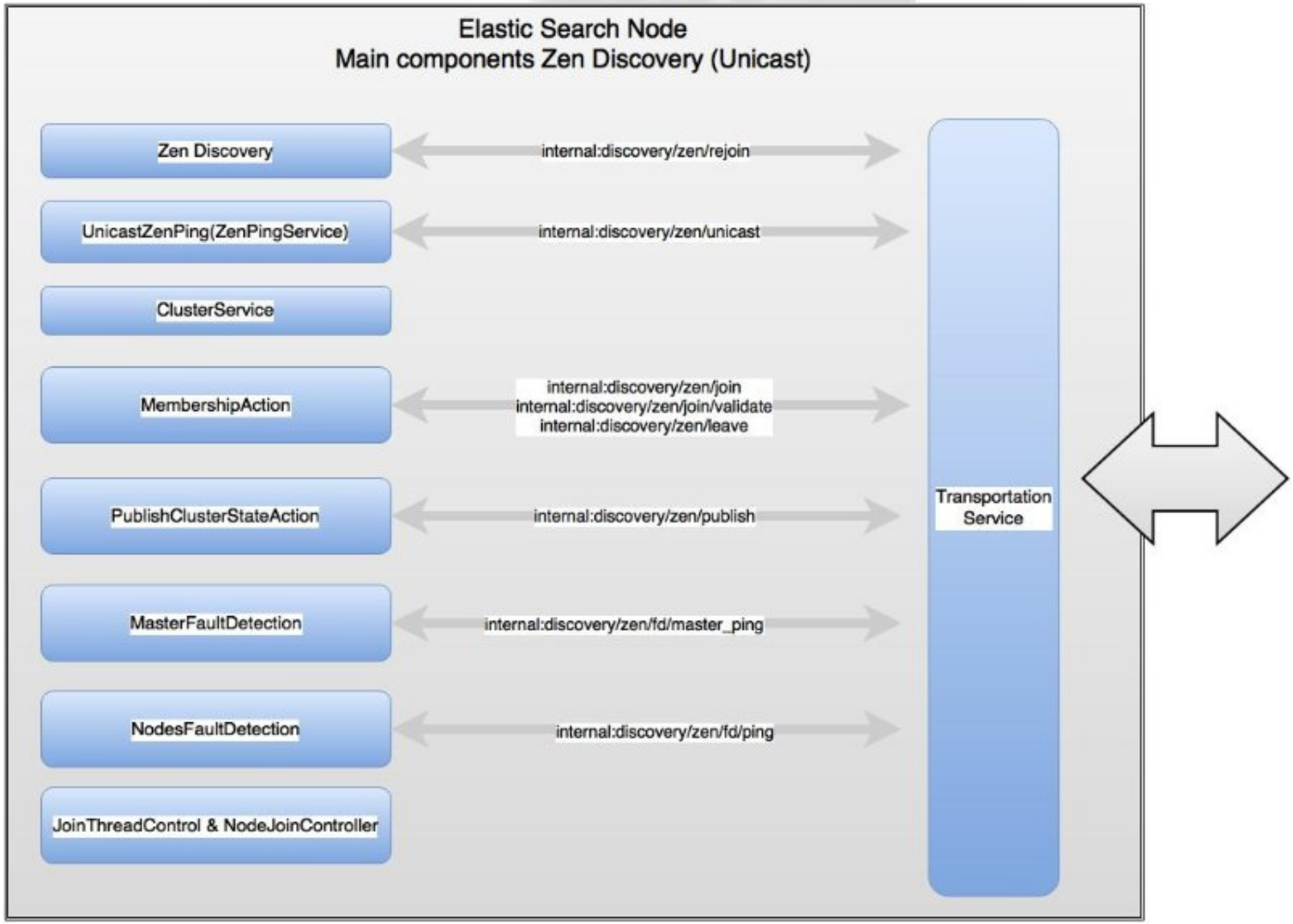
Inverted Index

Term	Doc1	Doc2
brown	X	X
dog	X	X
fox	X	X
in		X
jump	X	X
lazy	X	X
over	X	X
quick	X	X
summer		X
the	X	X

Weight Calculation for the summer

Term	Doc1	Doc2
the	X	X
summer	X	
Total	2	1

Zen Discovery



Advantages

Advantages

- **Built on top of Lucene**: It stores real world complex entities as JSON Documents and indexes them by default.
- **Full-text Search**: It supports full text search along with spatial search and tokkening and customizing the search.
- **Schema Free**: It accepts the JSON Documents and tries to detect the data structure and further adds the fields if not present. The fields can also be dropped.
- **RESTful API**: Searhc is API Driven.
- **Open Source**: All the documentation related to Elastic Search are Open for public.

Conclusion

Elastic Search allows to store, search and analyze huge amount of data quickly and in near real time.

It is a great open source tool built on top of LUCENE but uses JSON+RESTful API.

Also it is easy to setup and get started with.

And it is dynamically load balances just like Google does.

Future Scope

Future Scope

- To create zones within the cluster and and newly created shards are allotted to highly- ended zones and older shards are shifted to lower-ended zones. Hence lower ended zone have to provide much greater relevance during ranking which improves the search output.
- Shard selection is highly advantages till it is used in web searching. As it comes down to enterprises search where shards can be structured, shard selection proves costly at times.
- Automatically scaling can also be integrated in future.

References

Nil Goksel-Canbek ,Mehmet Emin Mutlu: On the track of Articial Intelligence: Learning with Intelligent Personal Assistants , 2016.

Harshita Phatnani, Mr. Jyotiprakash Patra, Ankit Sharma: An Intelligent Voice Assistant Using Android Platform , 2016

Vinay Sagar, Kusuma SM:Home Automation Using IOT , 2015

Douglas OShaughnessy, Senior Member: Interacting With Computers by Voice: Automatic Speech Recognition and Synthesis,2003

That's It
Thank You