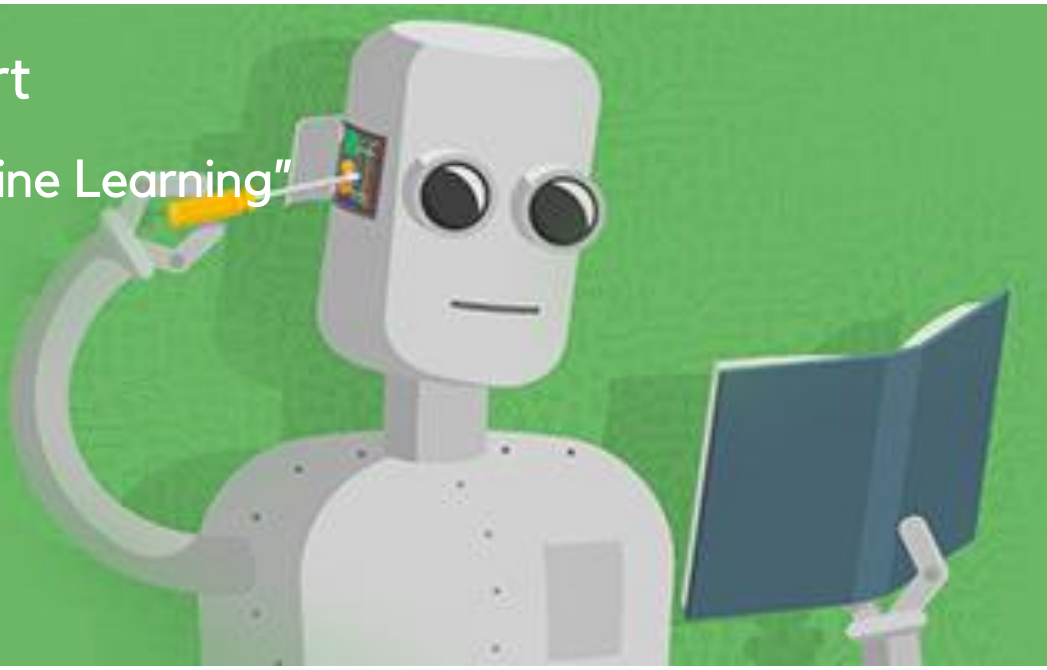
Landscape Report

On 2017 Filed "Machine Learning" Patent Applications



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Contents

1. INTRODUCTION

WHAT IS MACHINE LEARNING?

Machine learning is a method of data analysis that automates analytical model building. It is a branch of artificial intelligence based on the idea that machines should be able to learn and adapt through experience. Because of new computing technologies, machine learning today is not like machine learning of the past. It was born from pattern recognition and the theory that- "computers can learn without being programmed to perform specific tasks". The iterative aspect of machine learning is important because as models are exposed to new data, they are able to independently adapt. They learn from previous computations to produce reliable, repeatable decisions and results. Here are a few widely publicized examples of machine learning applications we may be familiar with: The heavily hyped, self-driving Google car, Online recommendation offers such as those from Amazon and Netflix, Knowing what customers are saying about you on Twitter and Fraud detection.[Source]

WHY IS MACHINE LEARNING IMPORTANT?

Machine learning has several very practical applications that have the potential to dramatically impact the future of an organization. Through Virtual Assistant solutions, machine learning automates tasks that would otherwise need to be performed by a live agent – such as changing a password or checking an account balance. This frees up valuable agent time that can be used to focus on the kind of customer care that humans perform best such as: high touch, complicated decision-making that is not as easily handled by a machine. At Interactions, user further improves the process by eliminating the decision of whether a request should be sent to a human or a machine. By using unique Adaptive Understanding technology, the machine learns to be aware of its limitations, and bail out to humans when it has a low confidence in providing the correct solution.[Source]

Who is using Machine Learning technology?

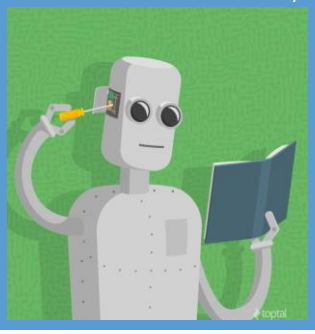
Most industries working with large amounts of data have recognized the value of machine learning technology. By gleaning insights from this data – often in real time – organizations are able to work more efficiently or gain an advantage over competitors.

Financial services:

Banks and other businesses in the financial industry use machine learning technology for two key purposes: to identify important insights in data, and prevent fraud. The insights can identify investment opportunities, or help investors know when to trade. Data mining can also identify clients with high-risk profiles, or use cyber surveillance to pinpoint warning signs of fraud.

Government:

Government agencies such as public safety and utilities have a particular need for machine learning since they have multiple sources of data that can be mined for insights. Analyzing sensor data, for example, identifies ways to increase efficiency and save money. Machine learning can also help detect fraud and minimize identity theft.

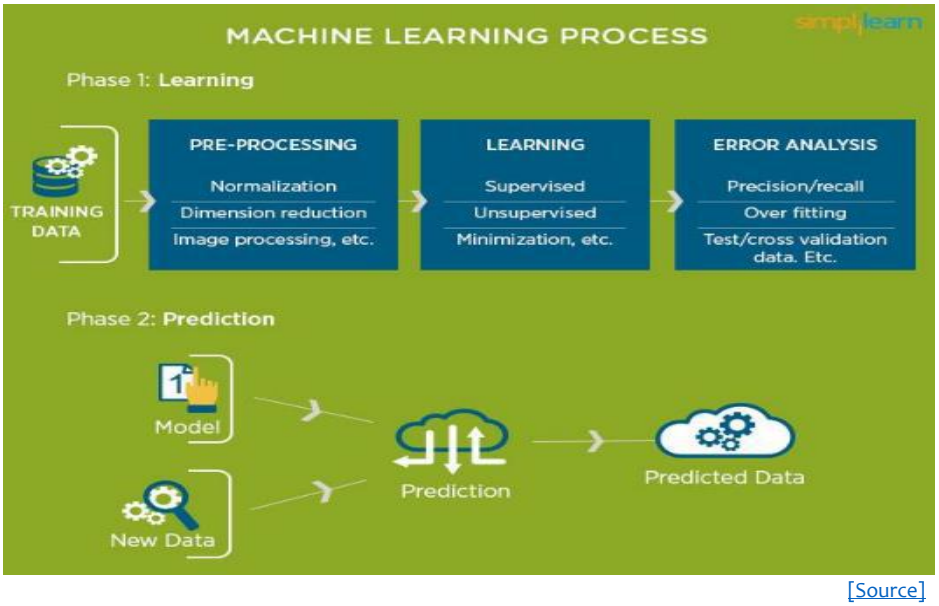


HOW MACHINE LEARNING WORKS?

In general, the machine learning process incorporates a training dataset that teaches a processor/computer/machine, what to do in specific conditions, the computer preforms a job/task, learns to classify the jobs given, tunes itself or the algorithms responsible for performing certain tasks. In machine learning, the machine available data is split into a set of data groups namely: training data, validation data, and test data, wherein the training data is used to build a mode. The model is validated against the validation data with careful analysis through a series of feedback processes. Model Tuning is performed and algorithms are trained for different scenarios and environments. The tuned model is deployed to work on a new data and perform predictions. Also, performance of the model is cross checked with the test data.

Algorithms: Machine learning algorithms primarily include: neural network, decision tree, random forest, genetic algorithm, expectation maximization, Bayesian network, kernel density estimation, principle component analysis, K-means clustering, self-organizing map etc.

Tools and Processes: The secret of getting value from Machine Learning lies in, pairing the best algorithms for the task at hand with— Comprehensive data and its management, GUIs for building models and process flows, Interactive data exploration and visualization, Automated ensemble model evaluation, Integrated end-to-end automation of the data-to-decision processes etc.[Source]



[Source]

Health care:

Machine learning is a fast-growing trend in the health care industry, thanks to the advent of wearable devices and sensors that can use data to assess a patient's health in real time. The technology can also help medical experts analyze data to identify trends or red flags that may lead to improved diagnoses and treatment.

Marketing and sales:

Websites recommending items you might like based on previous purchases are using machine learning to analyze your buying history – and promote other items you'd be interested in. This ability to capture data, analyze it and use it to personalize a shopping experience (or implement a marketing campaign) is the future of retail.

Oil and gas:

Oil and gas industry uses machine learning technology for finding new energy sources, Analyzing minerals in the ground, Predicting refinery sensor failure, Streamlining oil distribution to make it more efficient and cost-effective. The number of machine learning use cases for this industry is vast – and still expanding.

Transportation:

Analyzing data to identify patterns and trends is key to the transportation industry, which relies on making routes more efficient and predicting potential problems to increase profitability. The data analysis and modelling aspects of machine learning are important tools to delivery companies, public transportation and other transportation

WHAT ARE SOME POPULAR MACHINE LEARNING METHODS?

Supervised learning- Supervised learning algorithms are trained using labeled examples, such as an input where the desired output is known. For example, a piece of equipment could have data points labeled either "F" (failed) or "R" (runs). The learning algorithm receives a set of inputs along with the corresponding correct outputs, and the algorithm learns by comparing its actual output with correct outputs to find errors. It then modifies the model accordingly. Through methods like classification, regression, prediction and gradient boosting, supervised learning uses patterns to predict the values of the label on additional unlabeled data. Supervised learning is commonly used in applications where historical data predicts likely future events. For example, it can anticipate when credit card transactions are likely to be fraudulent or which insurance customer is likely to file a claim.

Unsupervised learning-Unsupervised learning is used against data that has no historical labels. The system is not told the "right answer." The algorithm must figure out what is being shown. The goal is to explore the data and find some structure within. Unsupervised learning works well on transactional data. For example, it can identify segments of customers with similar attributes who can then be treated similarly in marketing campaigns. Or it can find the main attributes that separate customer segments from each other. Popular techniques include self-organizing maps, nearest-neighbor mapping, k-means clustering and singular value decomposition. These algorithms are also used to segment text topics, recommend items and identify data outliers.

Semi-supervised- Semi-supervised learning is used for the same applications as supervised learning. But it uses both labeled and unlabeled data for training – typically a small amount of labeled data with a large amount of unlabeled data (because unlabeled data is less expensive and takes less effort to acquire). This type of learning can be used with methods such as classification, regression and prediction. Semi-supervised learning is useful when the cost associated with labeling is too high to allow for a fully labeled training process. Early examples of this include identifying a person's face on a web cam.

Reinforcement-Reinforcement learning is often used for robotics, gaming and navigation. With reinforcement learning, the algorithm discovers through trial and error which actions yield the greatest rewards. This type of learning has three primary components: the agent (the learner or decision maker), the environment (everything the agent interacts with) and actions (what the agent can do). The objective is for the agent to choose actions that maximize the expected reward over a given amount of time. The agent will reach the goal much faster by following a good policy. So the goal in reinforcement learning is to learn the best policy.

2. OBJECTIVES

- To perform detailed analysis of granted patents and published applications pertaining to Machine Learning and to understand underlying technologies.
- In depth analysis of patents/applications, in order to categorize them and to understand focussing areas of applicants.
- Graphical representation of trends (Applicant, Inventor, etc.) from mined data of relevant patents/applications.

Image Courtesy

Image Courtesy

3. SEARCH METHODOLOGY

The first step of this study was to create and define or retrieve a patent dataset that would serve as the basis of the study. For this, we begin withthe renowned patent database 'Questel Orbit'.

Patent search was carried out specifically for 2017 filed US patent applications, wherein all those applications that disclosed or mentioned 'Machine Learning' in their claim section were taken as relevant applications.

4. EXECUTIVE SUMMARY

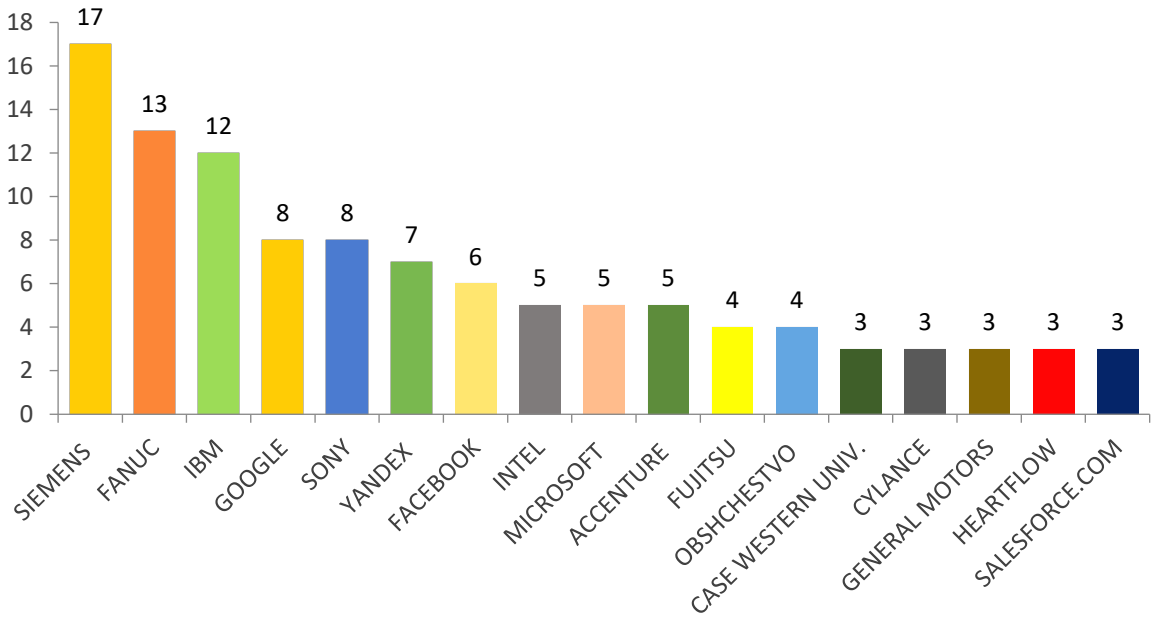
- A set of 548 patent families were analysed, which yeilded 271 relevant patent families.
- Siemens (17 patent families) is the leadingapplicant, followed by Fanuc (13 patent families). Other notable applicants that too have significant quantity of patent application filings are IBM, Google, Sony, Yandex, Facebook, Microshoft, Intel, and Accenture.
- Dorin Comaniciu, Mansi Tommaso, and Puneet Sharma come out as thedominating innovators in the technical field of Machine Learning. Notably, all inventors are engaged with 'Siemens'.
- In the technical field ofData Collection Method, majorityof patent apllications are mainly focussing on Computer/Machine/Device Based Data Collection (151 patent families) and Query Based Data Collection (36 patent families)
- In the technical field of Data Processing,majority of patent applications are focussing on Analysis/Computing (256 patent families) followed by Knowledge Based Problem Solving (147 patent families).
- In the technical field of Controlling/Regulating/Revising, majority of patent applications are focussing on Computer/Server(65 patent families) followed by Database Revising(24 patent families).
- Industries founding applications of Machine Learning comprising: Entertainment/Retail (22%), Medical/Healthcare(20%), Industrial/Enterprise/Military(10%), Transportation(6%), Oil/Gas /Agriculture/Space (2%) industry.

5. NON-TECHNICAL ANALYSIS

5.1 ASSIGNEE BASED TREND ANALYSIS

MAJOR ASSIGNEES (BASED ON REPRESENTATIVE MEMBER PER FAMILY)

Below graph represents major assignee trend, pertaining to Machine Learning and based on representative member per patent family.



INSIGHT:

As evident from overall data shown in the previous graph and representative member per family based data shown above, Siemens and Fanuc were found to be top assignees with highest number of innovations (individual patent families) as well as highest number of patent applications filed in US jurisdiction.

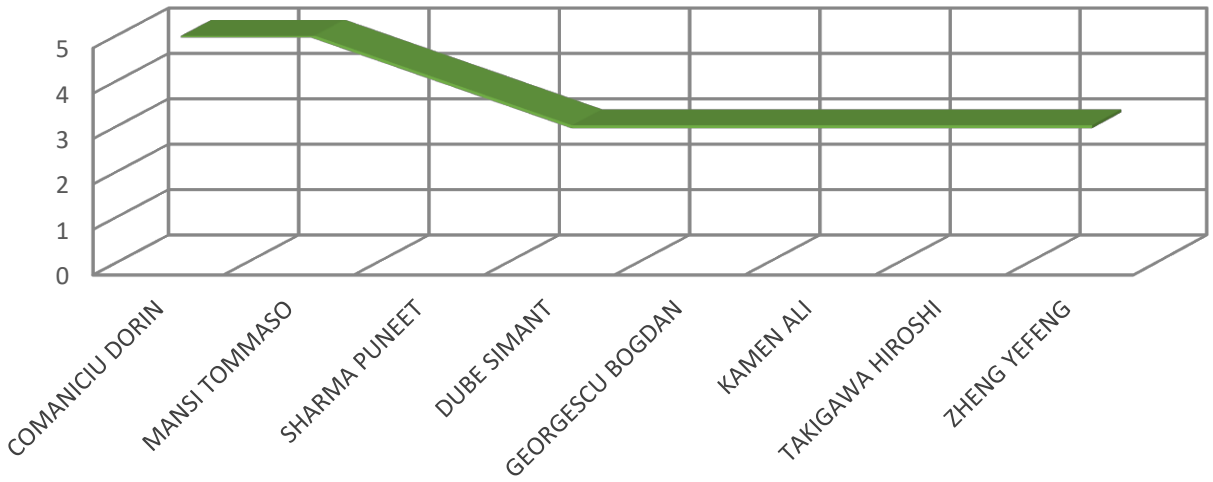
THE TOP ASSIGNEES ARE:

- Siemens
- Fanuc
- IBM
- Google
- Sony
- Yandex
- Facebook
- Intel

- Microsoft
- Accenture
- Fujitsu
- Obshchestvo
- Case Western University
- Cylance
- General Motors
- Heartflow
- ZTE

5.2 KEY INVENTORS

Below graph represents top inventors trend, pertaining to Machine Learning and based on representative member per patent family.

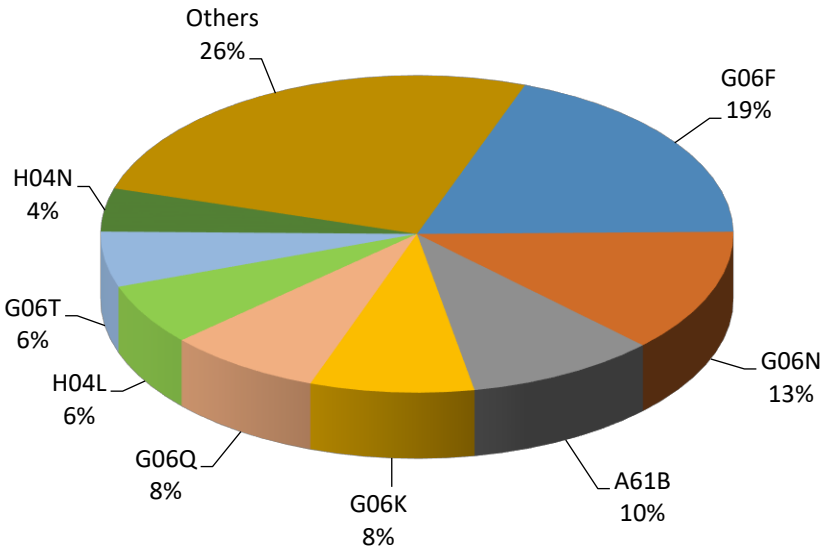


INSIGHT:

- Dorin Comaniciu and Mansi Tommaso **(Both from Siemens)** are the leading inventors with **5** patent families on their name. Puneet Sharma **(Siemens)** follows the top inventors with **4** patent families on his name.

5.3 INTERNATIONAL PATENT CLASSIFICATION BASED TREND

Below graph represents top international patent classes pertaining to Machine Learning (Based on representative member per patent family).



INSIGHT:

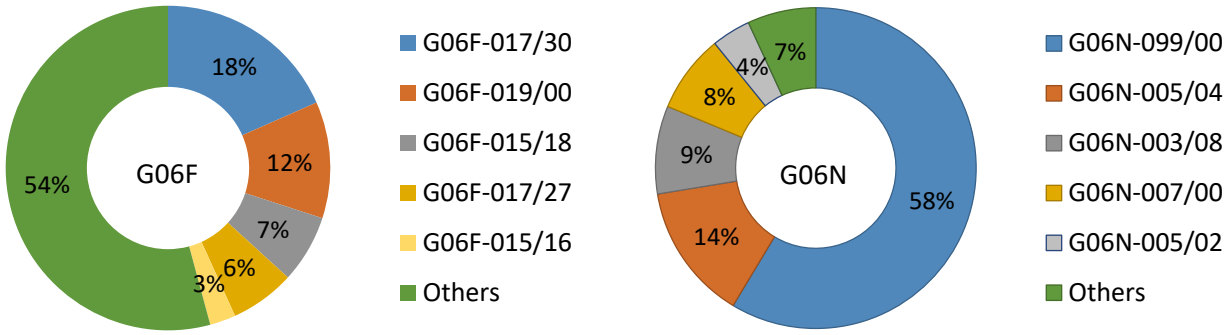
Majority of patent applications were assigned with IPC "G06F" followed by "G06N".

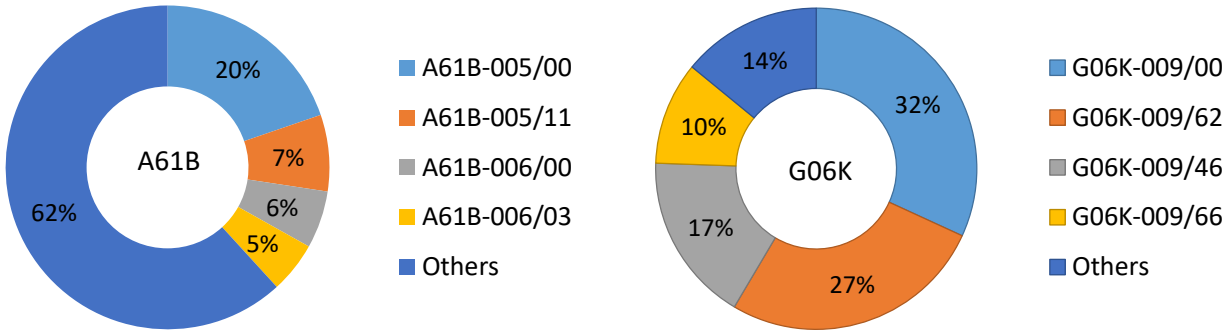
IPC DEFINITIONS:

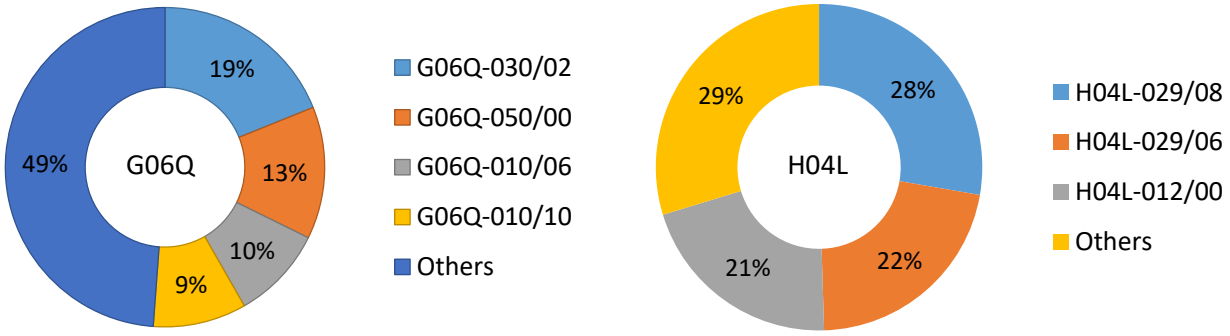
IPC Subclass	Definition
G06F	Electric Digital Data Processing
G06N	Computer Systems Based on Specific Computational Models
A61B	Diagnosis; Surgery; Identification
G06K	Recognition of Data; Presentation of Data; Record Carriers; Handling Record Carriers
G06Q	Data Processing Systems or Methods, Specially Adapted for Administrative, Commercial, Financial, Managerial, Supervisory or Forecasting Purposes; Systems or Methods Specially Adapted for Administrative, Commercial, Financial, Managerial, Supervisory or Forecasting Purposes
H04L	Transmission Of Digital Information, e.g. Telegraphic Communication
G06T	Image Data Processing Or Generation
H04N	Pictorial Communication, e.g. Television

5.4 INTERNATIONAL PATENT SUB-CLASSIFICATION BASED TREND

Below graph represents top international patent sub-classes pertaining to Machine Learning and (based on representative member per patent family.





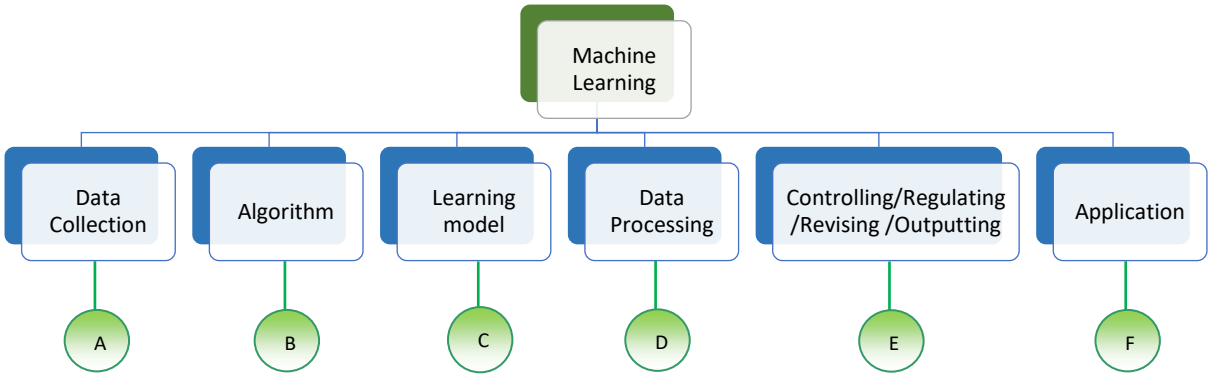


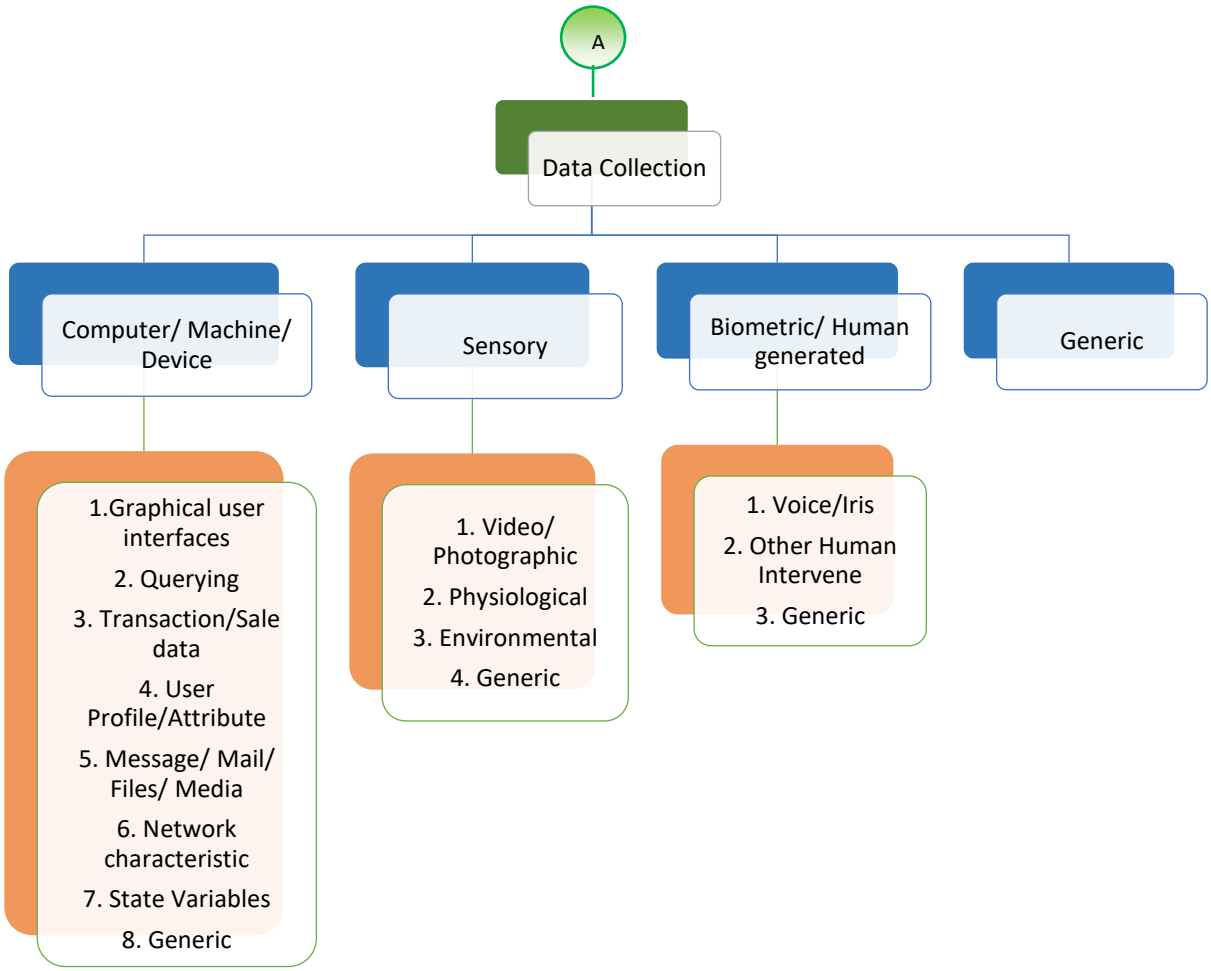
IPC SUBCLASS DEFINITIONS:

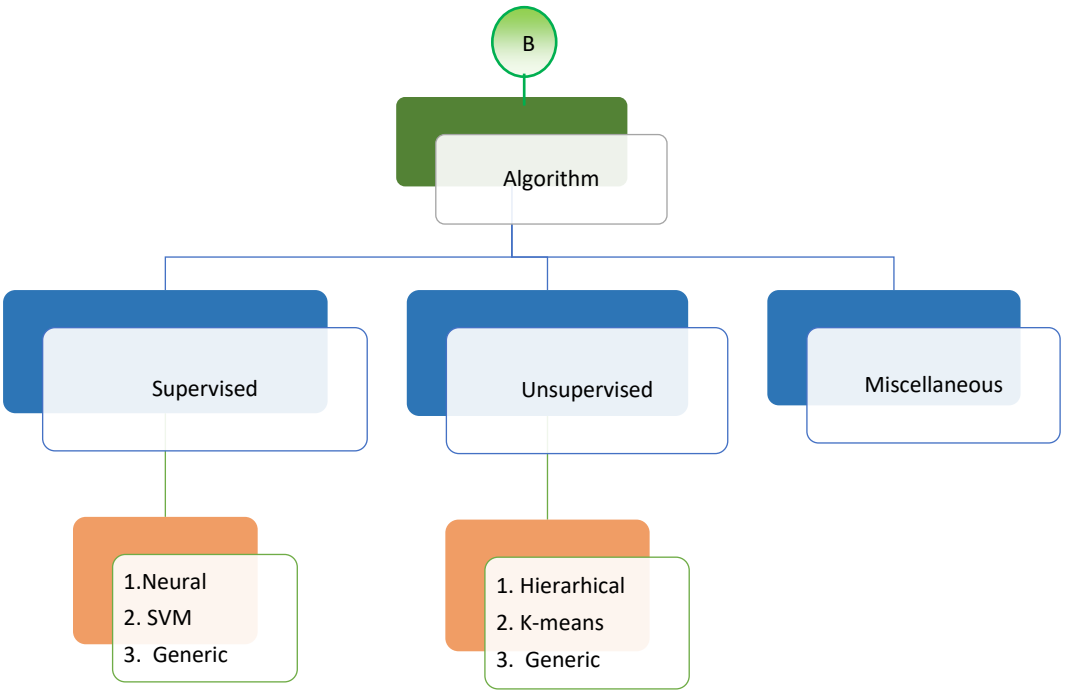
IPC Subclass	Definition
G06F-017/30	Digital computing or data processing equipment or methods, specially adapted for specific functions; Information retrieval; Database structures (File system structures)
G06F-019/00	Digital computing or data processing equipment or methods, specially adapted for specific applications (data processing systems or methods specially adapted for administrative, commercial, financial, managerial, supervisory or forecasting purposes; healthcare informatics)
G06F-015/18	Digital computers in general; Data processing equipment in general (neural networks for image data processing); in which a programme is changed according to experience gained by the computer itself during a complete run; Learning machines (adaptive control systems)
G06F-017/27	Digital computing or data processing equipment or methods, specially adapted for specific functions; Automatic analysis, e.g. parsing (speech recognition, analysis or synthesis)
G06F-015/16	Digital computers in general; Data processing equipment in general (neural networks for image data processing); Combinations of two or more digital computers each having at least an arithmetic unit, a programme unit and a register, e.g. for a simultaneous processing of several programmes
G06N-005/04	Computer systems utilising knowledge based models; Inference methods or devices
G06N-003/08	Computer systems based on biological models; Learning methods
G06N-007/00	Computer systems based on specific mathematical models
G06N-005/02	Computer systems utilising knowledge based models;Knowledge representation
A61B-005/00	Detecting, measuring or recording for diagnostic purposes (radiation diagnosis; diagnosis by ultrasonic, sonic or infrasonic waves); Identification of persons
A61B-005/11	Detecting, measuring or recording for diagnostic purposes (radiation diagnosis; diagnosis by ultrasonic, sonic or infrasonic waves); Identification of persons; Measuring movement of the entire body or parts thereof, e.g. head or hand tremor, mobility of a limb
A61B-006/00	Apparatus for radiation diagnosis, e.g. combined with radiation therapy equipment (analysis of materials using radiation, detecting hidden objects by radiation, radiodiagnostic or X-ray contrast preparations etc)
A61B-006/03	Apparatus for radiation diagnosis, e.g. combined with radiation therapy equipment; Computerised tomographs (diagnosis by magnetic resonance imaging; echo-tomography)
G06K-009/00	Methods or arrangements for reading or recognising printed or written characters or for recognising patterns, e.g. fingerprints (processing or analysis of tracks of nuclear particles)
G06K-009/62	Methods or arrangements for reading or recognising printed or written characters or for recognising patterns; Methods or arrangements for recognition using electronic means (learning machines; digital correlation; analogue correlation)
G06K-009/46	Methods or arrangements for reading or recognising printed or written characters or for recognising patterns; Extraction of features or characteristics of the image (segmentation of touching or overlapping patterns; edge detection for feature extraction; segmentation or edge detection for general image processing)
G06K-009/66	Methods or arrangements for reading or recognising printed or written characters or for recognising patterns; references adjustable by an adaptive method, e.g. learning
G06Q-030/02	Commerce, e.g. shopping or e-commerce; Marketing, e.g. market research and analysis, surveying, promotions, advertising, buyer profiling, customer management or rewards; Price estimation or determination
G06Q-050/00	Systems or methods specially adapted for specific business sectors, e.g. utilities or tourism (healthcare informatics)
G06Q-010/06	Administration; Management; Resources, workflows, human or project management, e.g. organising, planning, scheduling or allocating time, human or machine resources; Enterprise planning; Organisational models

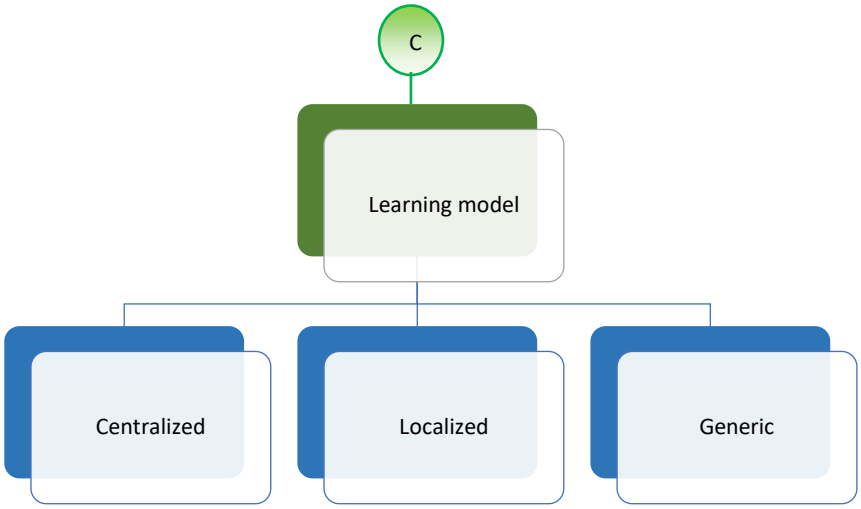
G06Q-010/10	Administration; Management; Office automation, e.g. computer aided management of electronic mail or groupware (electronic mail protocols)
H04L-029/08	Arrangements, apparatus, circuits or systems, not covered by a single one of groups; Transmission control procedure, e.g. data link level control procedure
H04L-029/06	Arrangements, apparatus, circuits or systems, not covered by a single one of groups; characterised by a protocol
H04L-012/00	Data switching networks(interconnection of, or transfer of information or other signals between, memories, input/output devices or central processing units)

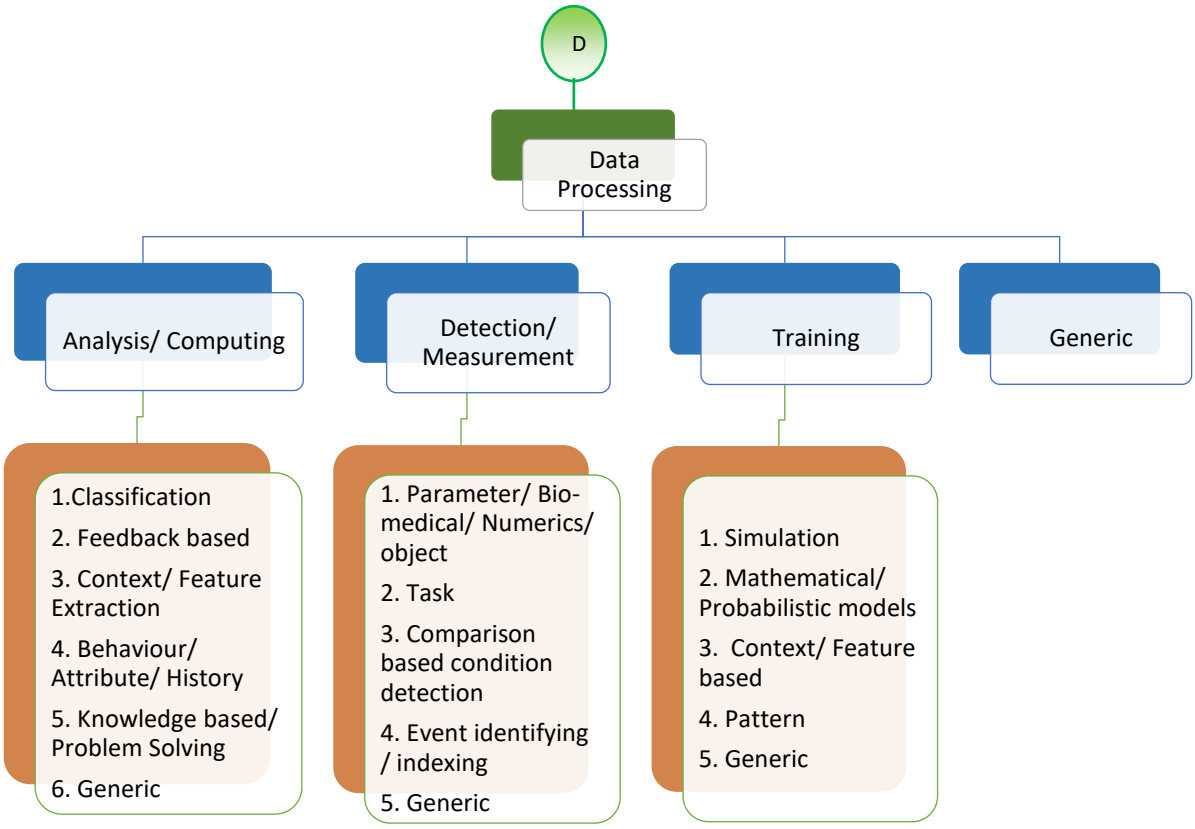
6. TECHNICAL TAXONOMY

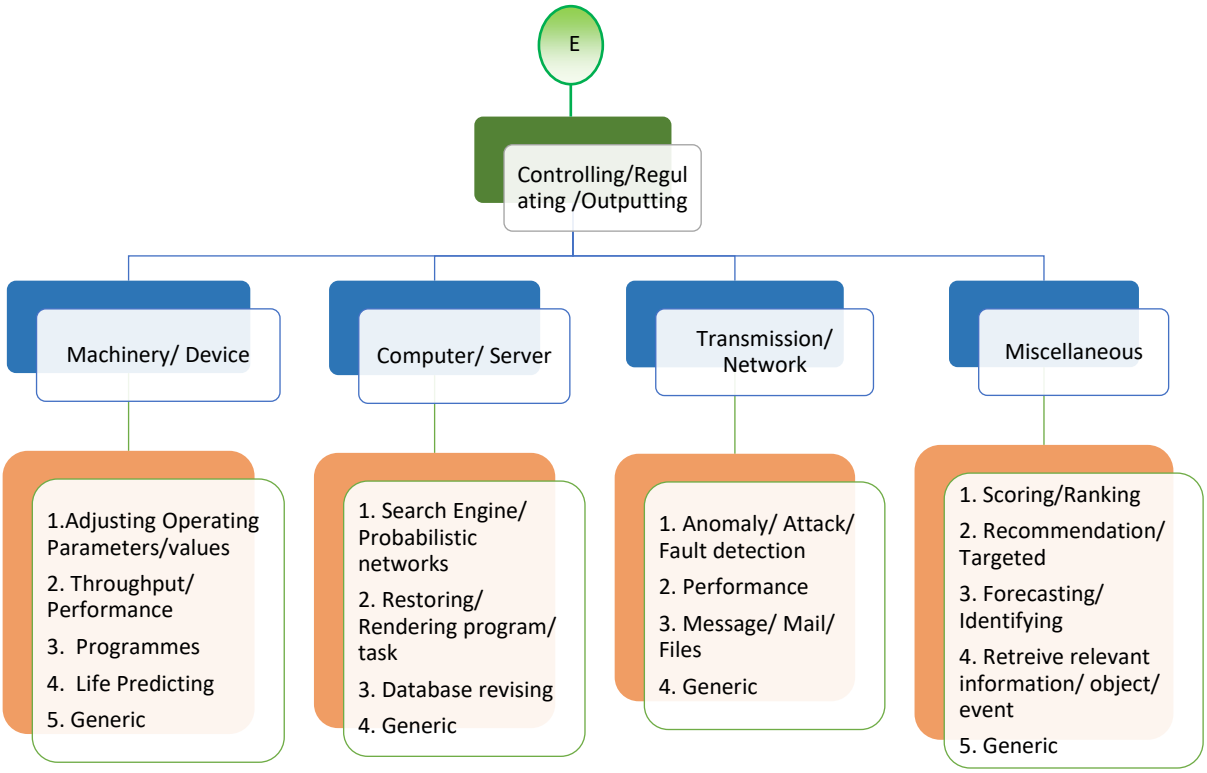


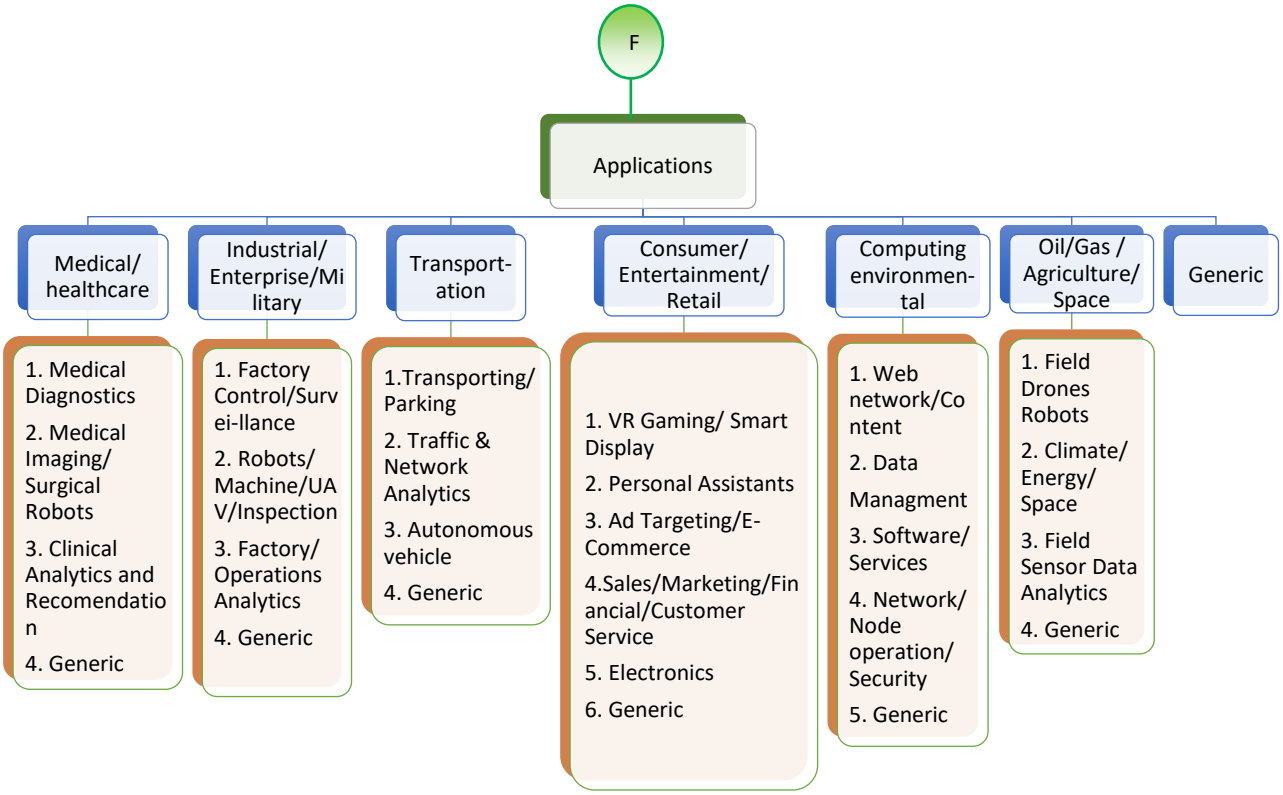



B
Algorithm
Supervised
Unsupervised
Miscellaneous
1.Neural
2. SVM
3. Generic
1. Hierarhical
2. K-means
3. Generic


C
Learning model
Centralized
Localized
Generic


D
Data Processing
Analysis/ Computing
Detection/ Measurement
Training
Generic
1.Classification
2. Feedback based
3. Context/ Feature Extraction
4. Behaviour/ Attribute/ History
5. Knowledge based/ Problem Solving
6. Generic
1. Parameter/ Bio-medical/ Numerics/ object
2. Task
3. Comparison based condition detection
4. Event identifying / indexing
5. Generic
1. Simulation
2. Mathematical/ Probabilistic models
3. Context/ Feature based
4. Pattern
5. Generic

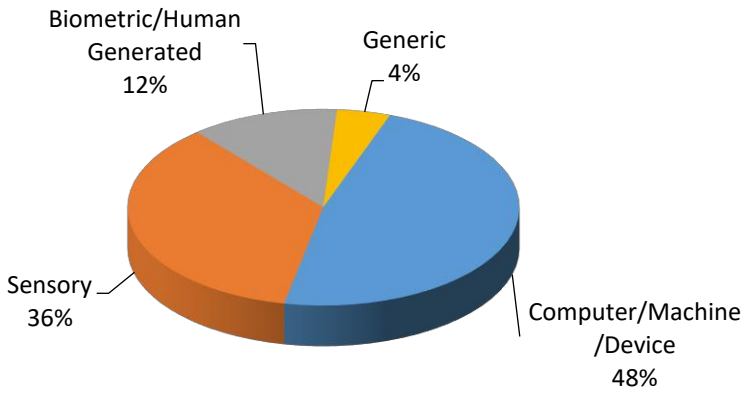

E
Controlling/Regulating /Outputting
Machinery/ Device
Computer/ Server
Transmission/ Network
Miscellaneous
1.Adjusting Operating Parameters/values
2. Throughput/ Performance
3. Programmes
4. Life Predicting
5. Generic
1. Search Engine/ Probabilistic networks
2. Restoring/ Rendering program/ task
3. Database revising
4. Generic
1. Anomaly/ Attack/ Fault detection
2. Performance
3. Message/ Mail/ Files
4. Generic
1. Scoring/Ranking
2. Recommendation/ Targeted
3. Forecasting/ Identifying
4. Retreive relevant information/ object/ event
5. Generic


F
Applications
Medical/ healthcare
Industrial/ Enterprise/Military
Transport-ation
Consumer/ Entertainment/ Retail
Computing environmen-tal
Oil/Gas / Agriculture/ Space
Generic
1. Medical Diagnostics
2. Medical Imaging/ Surgical Robots
3. Clinical Analytics and Recomendation
4. Generic
1. Factory Control/Surv ei-llance
2. Robots/ Machine/UAV/Inspection
3. Factory/ Operations Analytics
4. Generic
1.Transporting/ Parking
2. Traffic & Network Analytics
3. Autonomous vehicle
4. Generic
1. VR Gaming/ Smart Display
2. Personal Assistants
3. Ad Targeting/E-Commerce
4.Sales/Marketing/Financial/Customer Service
5. Electronics
6. Generic
1. Web network/Content
2. Data Managment
3. Software/ Services
4. Network/ Node operation/ Security
5. Generic
1. Field Drones Robots
2. Climate/ Energy/ Space
3. Field Sensor Data Analytics
4. Generic

7. TECHNICAL TREND ANALYSIS

7.1 DISTRIBUTION OF PATENTS/APPLICATIONS PERTAINING TO"DATA COLLECTION"

This category deals with patents/applications focusing on methods of data collection, wherein Machine Learning is used as the underlining technology. Below representation shows the percentage of applications falling under sub-categories such as e.g. Computer/machine/device, Sensory, and Biometric/Human generated.



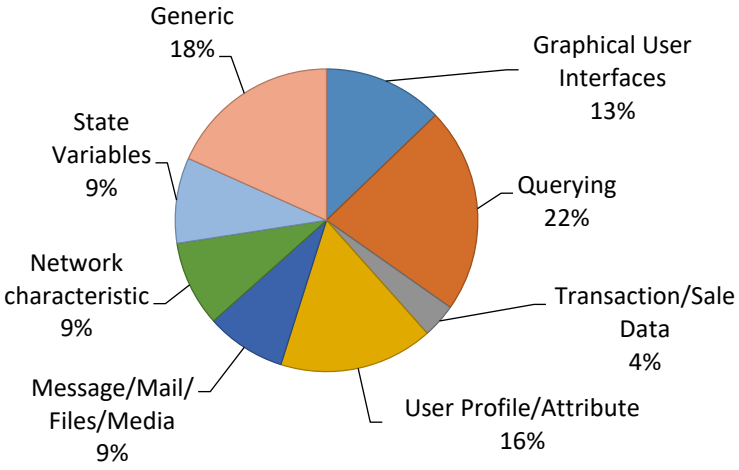
INSIGHT:

As evident, maximum number of patents/applications are falling under computer/machine/device **(48%)** followed by Sensory **(36%)**.

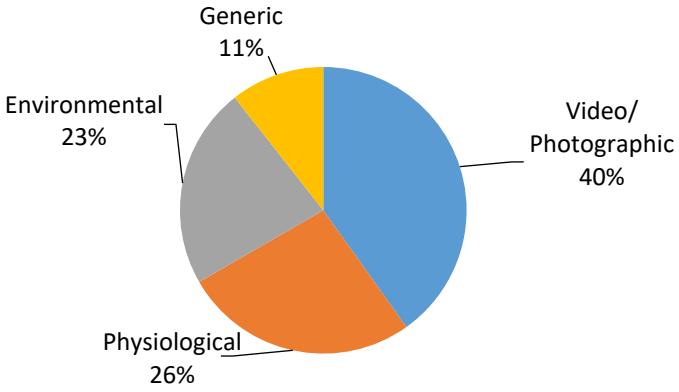
7.1.1 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "COMPUTER/MACHINE/DEVICE"

INSIGHT:

As evident, maximum number of patents/applications are falling under Querying **(22%)** followed by User profile/attribute **(16%)**.



7.1.2 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "SENSORY BASED"



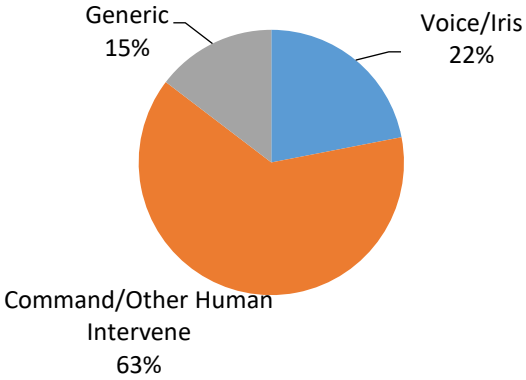
INSIGHT:

As evident, maximum number of patents/applications are falling under Video/Photographic **(40%)** followed by Physiological **(26%)**.

7.1.3 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "BIOMETRIC/HUMAN GENERATED INPUT"

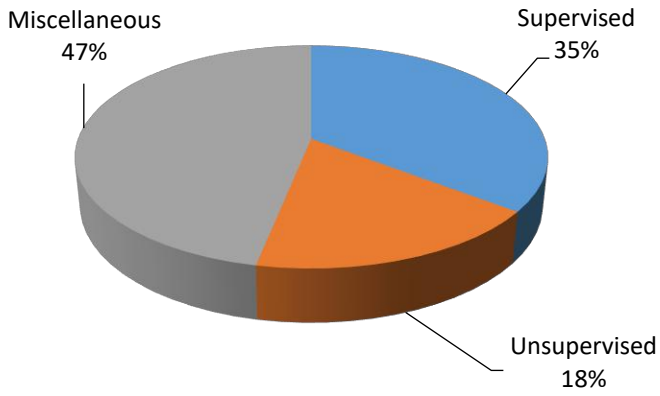
INSIGHT:

As evident, maximum number of patents/applications are falling under Command/Other human intervene **(63%)** followed by Voice/Iris **(22%)**.



7.2 DISTRIBUTION OF PATENTS/APPLICATIONS PERTAININGTO "ALGORITHMS"

This category deals with patents/applications focusing on various Algorithm being used in Machine Learning technology. Below representation shows the percentage of applications falling under sub-categories such as e.g. Supervised and Unsupervised.



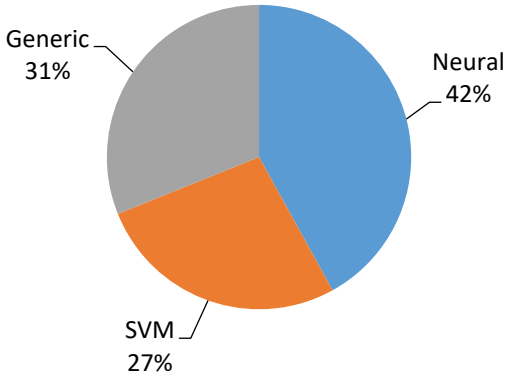
INSIGHT:

As evident, maximum number of patents/applications are falling under Supervised **(35%)** followed by Unsupervised **(18%)**.

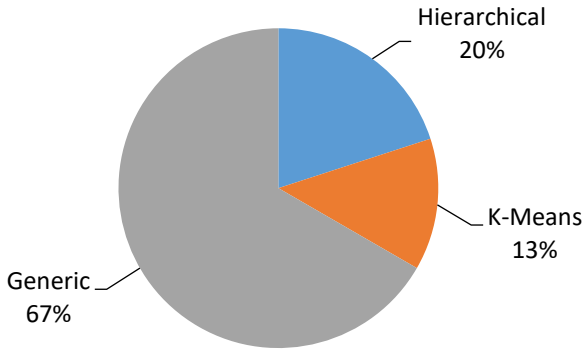
7.2.1 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "SUPERVISED"

INSIGHT:

As evident, maximum number of patents/applications are falling under Neural **(42%)** followed by SVM **(27%).**



7.2.2 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "UNSUPERVISED"

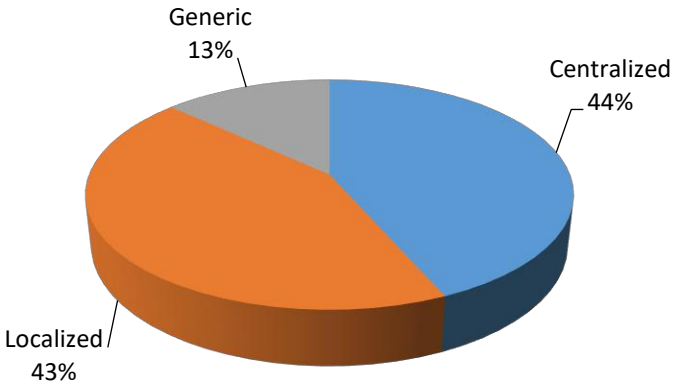


INSIGHT:

As evident, maximum number of patents/applications are falling under Hierarchical **(20%)** followed by K-means **(5%).**

7.3 DISTRIBUTION OF PATENTS/APPLICATIONS PERTAINING TO "LEARNING MODELS"

This category deals with patents/applications focusing on Learning Models being used in Machine Learning technology. Below representation shows the percentage of applications falling under sub-categories such as e.g. Centralized and Localized.



INSIGHT:

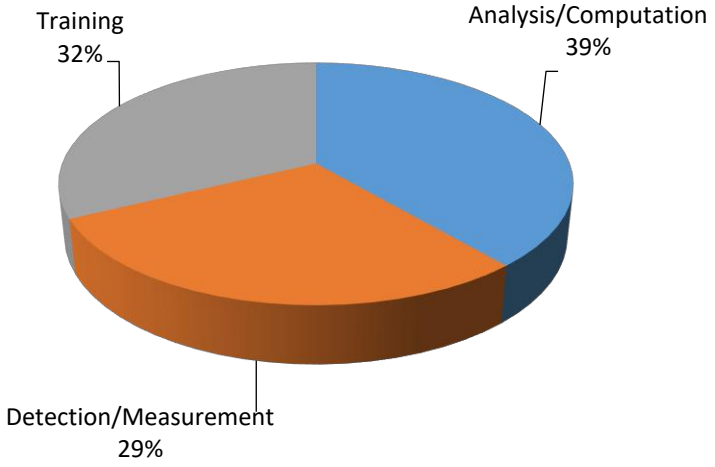
As evident, almost equal number of patents/applications are falling under Centralized **(44%),**and Localized **(43%)**sub-category.

7.4 DISTRIBUTION OF PATENTS/APPLICATIONS PERTAINING TO "DATA PROCESSING"

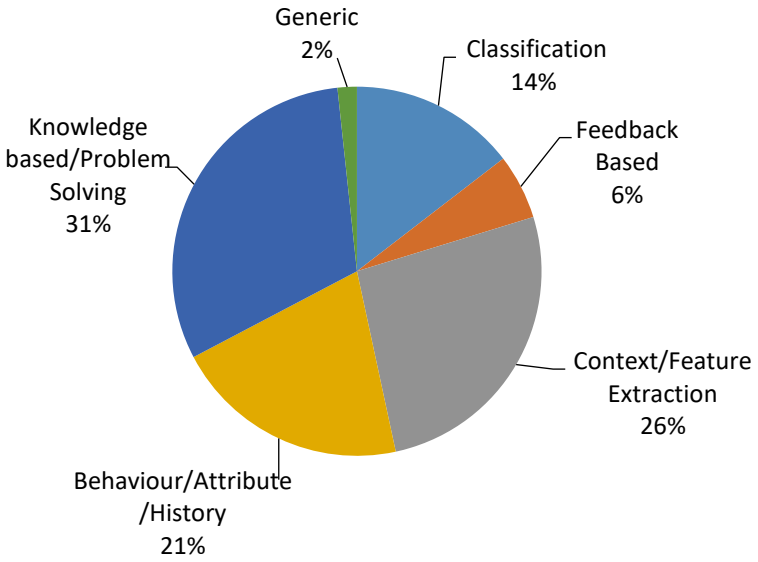
This category deals with patents/applications focusing on Data Processing being used in Machine Learning technology. Below representation shows the percentage of applications falling under sub-categories such as e.g. Analysis/Computation, Detection/Measurement and Training.

INSIGHT:

As evident, maximum number of patents/applications are falling under, Analysis/Computation **(39%)** followed by Training **(32%)**.



7.4.1 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "ANALYSIS"



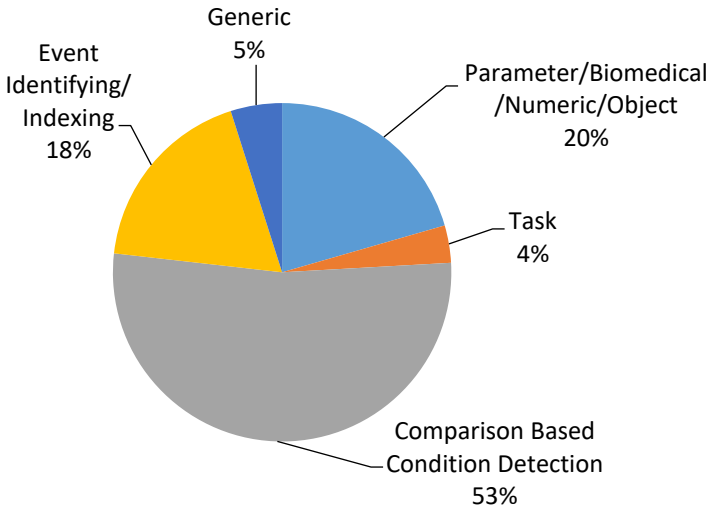
INSIGHT:

As evident, maximum number of patents/applications are falling under Knowledge based/Problem Solving **(31%)** followed by Context/Feature extraction**(26%).**

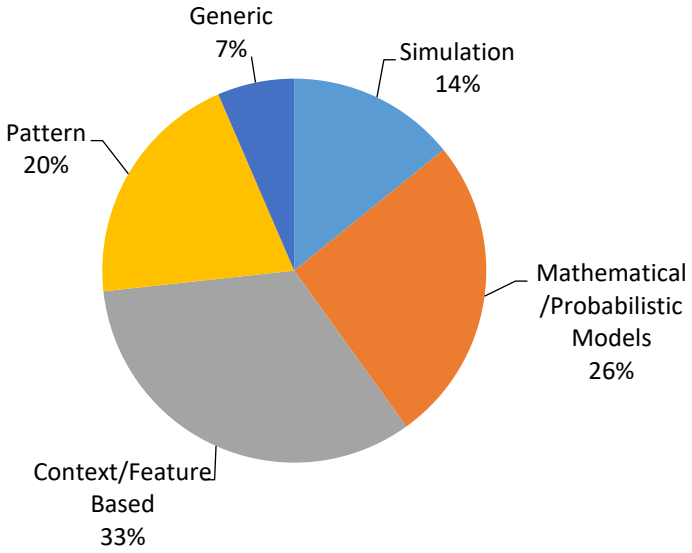
7.4.2 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "DETECTION/MEASUREMENT"

INSIGHT:

As evident, maximum number of patents/applications are falling under Comparison based condition detection**(53%)** followed by Parameter/Biomedical/Numeric /object detection**(20%).**



7.4.3 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "TRAINING"



INSIGHT:

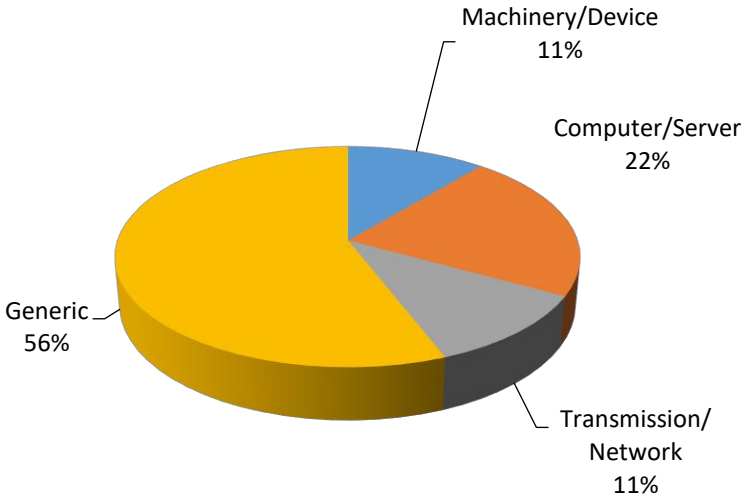
As evident, maximum number of patents/applications are falling under Context/Feature based training **(33%)** followed by Mathematical/Probabilistic models training **(26%)**.

7.5 DISTRIBUTION OF PATENTS/APPLICATIONS PERTAINING TO "CONTROLLING/REGULATING/REVISING"

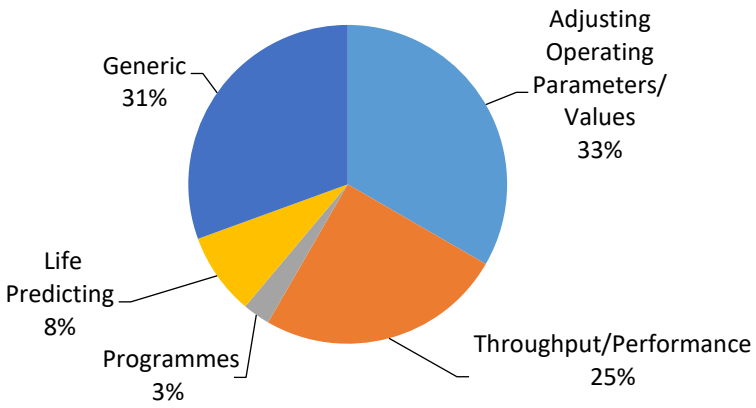
This category deals with patents/applications focusing on Controlling/Regulating/Revising being used in Machine Learning technology. Below representation shows the percentage of applications falling under sub-categories such as e.g. Machinery/Device, Computer/Server and Transmission/Network.

INSIGHT:

As evident, maximum number of patents/applications are falling under Computer/Server(**22%**) followed by Machinery/Device, Transmission/Network (**11%**)each.



7.5.1 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "MACHINERY/DEVICE"



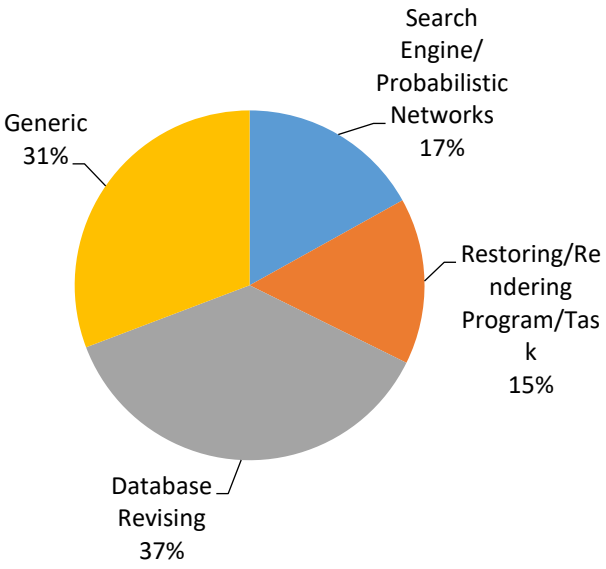
INSIGHT:

As evident, maximum number of patents/applications are falling under Adjusting Operating Parameters/values of machine/device (**33%**) followed by Throughput/Performance (**25%**).

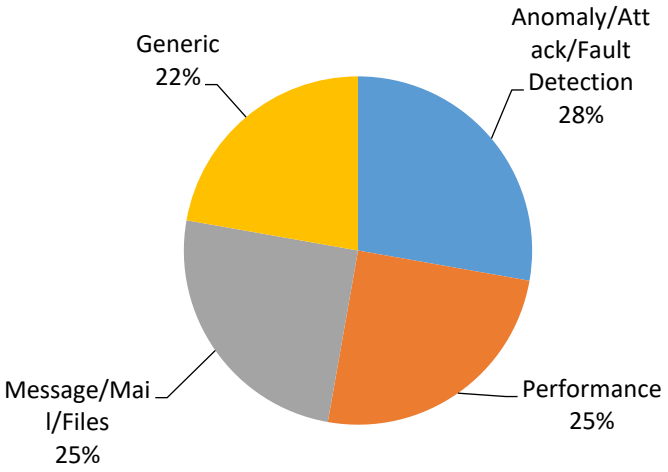
7.5.2 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "COMPUTER/SERVER"

INSIGHT:

As evident, maximum number of patents/applications are falling under Database revising **(37%)** followed by Search Engine/ Probabilistic networks**(17%).**



7.5.3 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "TRANSMISSION/NETWORK"



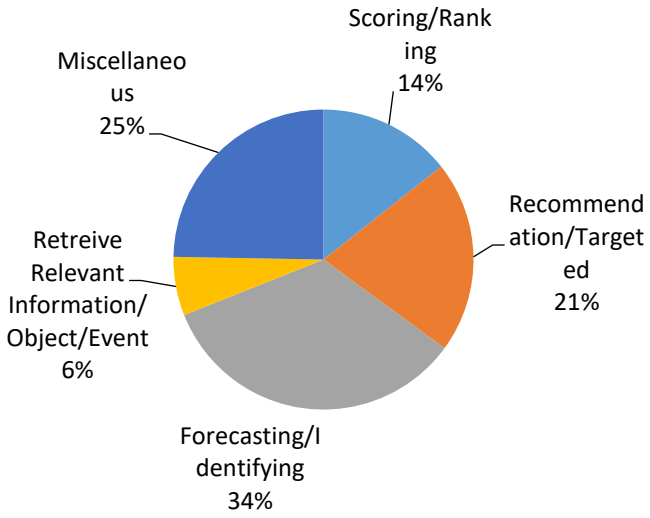
INSIGHT:

As evident, maximum number of patents/applications are falling under Anomaly/Attack/Fault detection **(46%)** followed by Message/Mail/Files**(25%) and** Performance**(25%).**

7.5.4 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "GENERIC"

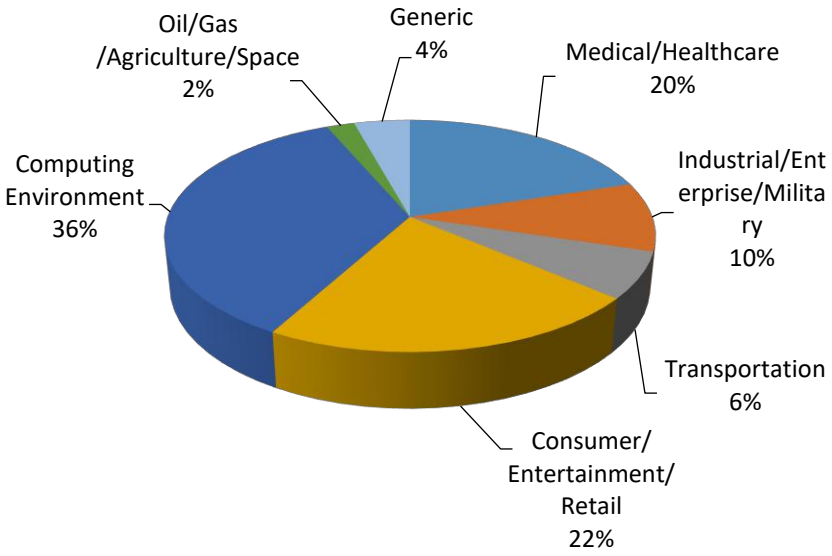
INSIGHT:

As evident, maximum number of patents/applications are falling under Forecasting/Identifying (34%) followed by Recommendation (21%).



7.6 DISTRIBUTION OF PATENTS/APPLICATIONS BASED ON "APPLICATIONS"

This category deals with patents/applications disclosing commercial application for Machine Learning technology. Below representation shows the percentage of applications falling under sub-categories such as e.g. Medical/healthcare, Industrial/Enterprise/Military, Transportation, Consumer/ Entertainment/ Retail, Computing environment, and Oil/Gas /Agriculture/Space among others



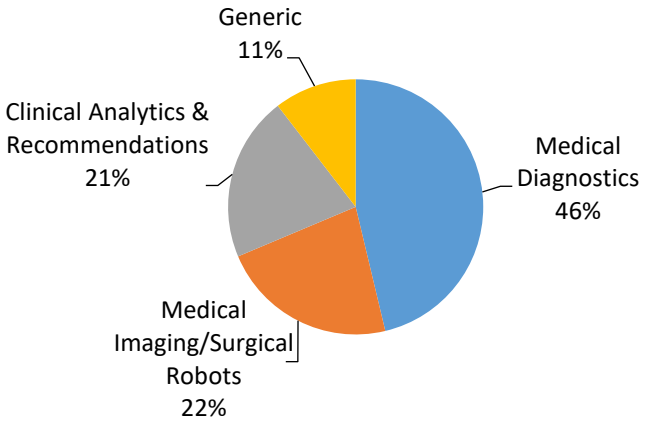
INSIGHT:

As evident, maximum number of patents/applications are falling under Computing device or environment **(36%)** followed by Consumer/ Entertainment/ Retail application **(5%).**

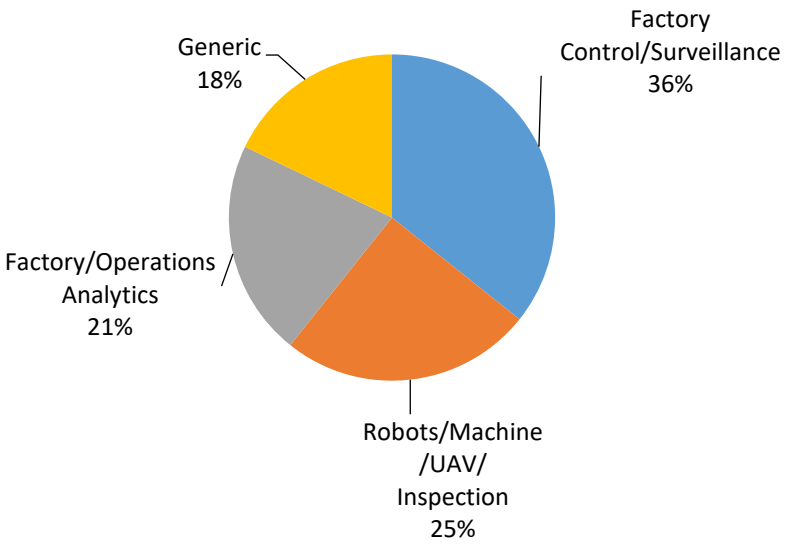
7.6.1 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "MEDICAL/HEALTHCARE"

INSIGHT:

As evident, maximum number of patents/applications are falling under Medical Diagnostics **(46%)** followed by Medical Imaging/Surgical Robots**(22%),** and Clinical Analytics & Recommendations**(21%).**



7.6.2 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "INDUSTRIAL/ENTERPRISE/ MILITARY"



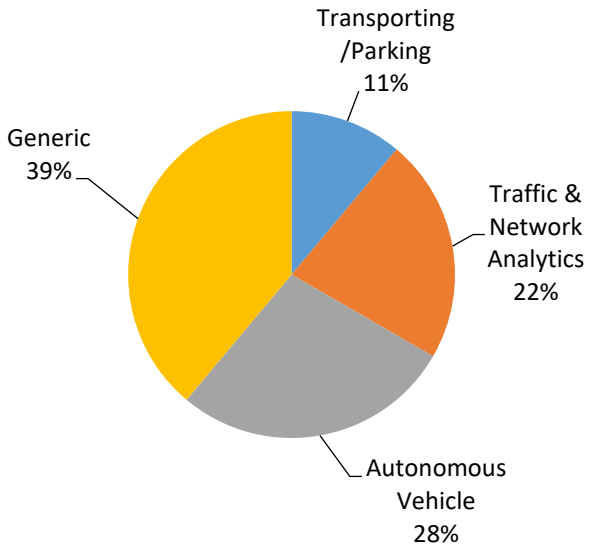
INSIGHT:

As evident, maximum number of patents/applications are falling under Factory Control/Surveillance **(36%)** followed by Robots/Machine/UAV/ Inspection**(25%).**

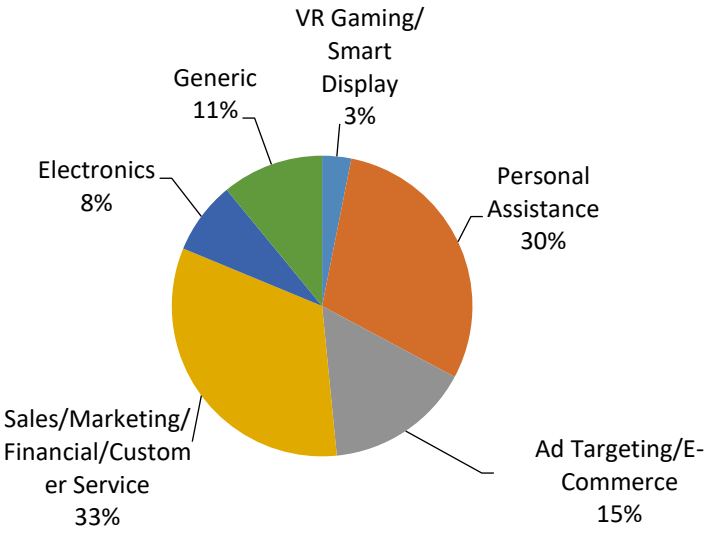
7.6.3 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "TRANSPORTATION"

INSIGHT:

As evident, maximum number of patents/applications are falling under Autonomous vehicle **(28%)** followed by Traffic & Network Analytics**(22%).**



7.6.4 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "CONSUMER/ ENTERTAINMENT/RETAIL"



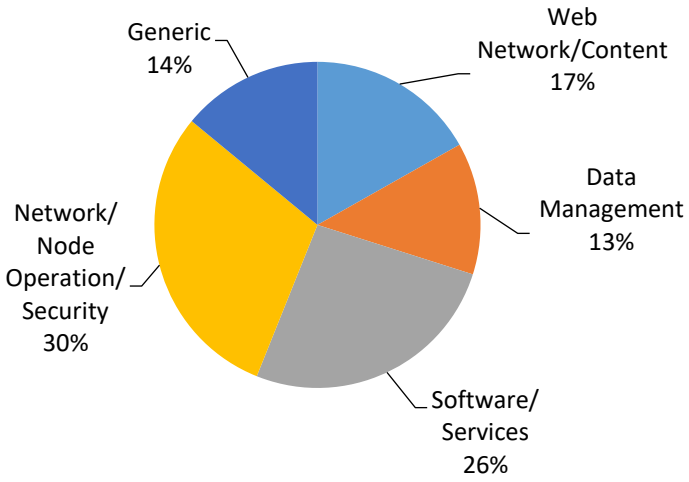
INSIGHT:

As evident, maximum number of patents/applications are falling under Sales/Marketing/Financial/Custo mer Service **(33%)** followed by Personal Assistance **(30%).**

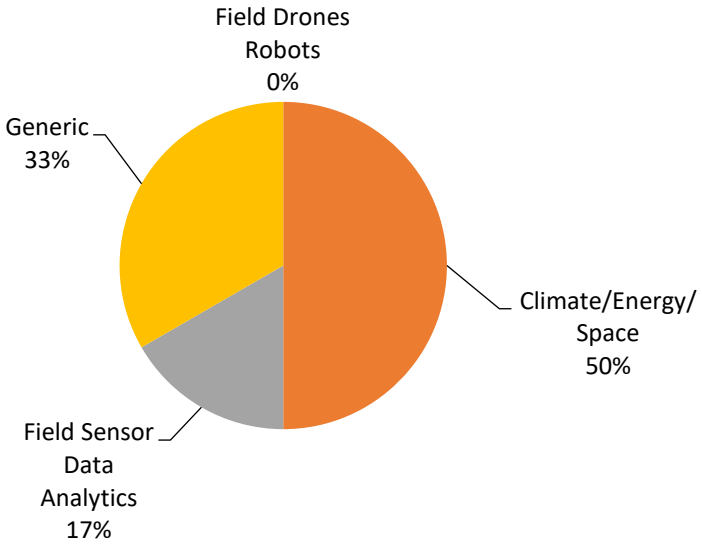
7.6.5 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "COMPUTING ENVIRONMENT"

INSIGHT:

As evident, maximum number of patents/applications are falling under Network/ Node operation/Security **(30%)** followed by Software/ Services**(26%).**



7.6.6 DISSECTION OF PATENTS/APPLICATIONS PERTAINING TO SUB-CATEGORY "OIL/GAS /AGRICULTURE/SPACE"



INSIGHT:

As evident, maximum number of patents/applications are falling under Climate/Energy/Space **(50%)** followed by Field Sensor Data Analytics**(17%).**

8. PATENT PORTFOLIO ANALYSIS- CORPORATES IN BLOCK CHAIN TECHNOLOGY

Based on analysis of recent developments in Machine Learning Technology, exemplary corporates contributing majorly towards development and usage of Machine Learning have been identified.

8.1 Siemens

Siemens long-term commitment in India began in 1867, when Werner von Siemens personally supervised the setting up of the first telegraph line between London and Calcutta. Today, Siemens has 22 factories located across the country, eight centers of Competence, 11 R&D centers and a nationwide sales and service network.[Source]

Siemens has been using neural networks to monitor its steel plant operations and improved efficiency since the 1990s and currently employs around 200 employees to advance machine learning in the coming years. One of the company's more exciting technologies that utilize AI for automation and other systems is its Mind Sphere open-IoT OS, which lets it monitor, record, and analyze nearly every facet of manufacturing—from production design to maintenance.[Source]

Siemens has developed a *simulation environment* for *neural* networks (SENN) that can be used to answer various questions. Among other things, SENN can predict raw material prices. For example, in two out of three cases the software can forecast *electricity* prices for the next 20 days — including the best day to purchase *electricity*.[Source]

EXEMPLARY PATENTS/PUBLISHED APPLICATIONS

Patent No.	Claim
US2017357844	A method for image-based tumor phenotyping in a medical system, the method comprising: acquiring medical scan data representing a tumor in tissue of a patient; extracting a set of features from the medical scan data; inputting the features to a machine trained classifier, the machine trained classifier trained, at least in part, from synthetically generated images not specific to training data for existing patient cases and based on a tumor model; determining, by application of the machine-trained classifier to the features, phenotype information of the tumor; and outputting the phenotype information.
US2017337713	A method for optimizing an image reconstruction algorithm, the method comprising: provisioning a set of training data sets, each of the training data sets respectively including an acquisition data set; generating a first medical image for each of the training data sets of at least one first subset of the set of training data sets using the image reconstruction algorithm based on a respective acquisition data set; determining an image processing result for each of the respective first medical images using an image processing algorithm based on the respective first medical image; determining image processing information for each of the respective first medical images relating to a quality of the respective image processing result based on the respective image processing result; and optimizing the image reconstruction algorithm based on a first machine learning algorithm, the at least one first subset of the set of training data sets and the image processing information for the respective first medical images.

US2017262733	A method for machine learning based classification of vascular branches to distinguish falsely detected branches from true branches, comprising: sampling a plurality of overlapping fixed size branch segments from one or more branches of a detected centerline tree of a target vessel extracted from a medical image of a patient; extracting a plurality of 1D profiles along each of the plurality of overlapping fixed size branch segments; calculating a probability score for each of the plurality of overlapping fixed size branch segments based on the plurality of 1D profiles using a trained deep neural network classifier; assigning a final probability score to each of a plurality of centerline points in the one or more branches of the detected centerline tree of the target vessel based on the probability scores of the overlapping fixed size branch segments containing that centerline point; and pruning the one or more branches of the detected centerline tree of the target vessel based on the final probability scores of the plurality of centerline points in the one or more branches of the detected centerline tree of the target vessel.
US2017308656	A method for content-based rendering based on machine learning in a rendering system, the method comprising: loading, from memory, a medical dataset representing a three-dimensional region of a patient; applying, by a machine, the medical dataset to a machine-learnt model, the machine-learned model trained with deep learning to extract features from the medical dataset and trained to output values for two or more volume rendering parameters based on input of the medical dataset, the two or more volume rendering parameters being settings of a volume renderer, the settings used by the volume renderer to control rendering from three dimensions to two-dimensions; rendering, by the volume renderer, an image of the three-dimensional region of the patient using the output values resulting from the applying as the settings to control the rendering from the medical dataset, the rendering of the medical dataset of the three-dimensional region being to the image in the two-dimensions; and transmitting the image.
US2017255745	A method for medical image based patient-specific stroke risk prediction, comprising: extracting left atrium (LA) and left atrium appendage (LAA) measurements from medical image data of a patient; computing derived metrics for the LA and LAA of the patient using a patient-specific computational model of cardiac function based on the LA and LAA measurements extracted from the medical image data of the patient; and calculating a stroke risk score for the patient based on the extracted LA and LAA measurements and the computed derived metrics for the LA and LAA of the patient using a trained machine learning based classifier, wherein the extracted LA and LAA measurements and the computed derived metrics for the LA and LAA are input as features to the trained machine learning based classifier.
US2017217102	A method for generating a patient-specific 3D printed model of a target organ from multiple medical imaging modalities, comprising: fusing a plurality of medical images of a target organ of a patient from different medical imaging modalities; generating a holistic mesh model of the target organ by segmenting the target organ in the fused medical images from the different medical imaging modalities; estimating one or more spatially varying physiological parameter from the fused medical images and mapping the estimated one or more spatially varying physiological parameter to the holistic mesh model of the target organ; and3D printing the holistic mesh model of the target organ including a representation of the estimated one or more spatially varying physiological parameter mapped to the holistic mesh model.
US2017258433	A method for extracting a centerline of a target vessel in a medical image of a patient, comprising: estimating a vessel orientation tensor for each of a plurality of voxels associated with the target vessel in the medical image using a trained vessel orientation tensor classifier; estimating a flow field for the plurality of voxels associated with the target vessel in the medical image based on the vessel orientation tensor estimated for each of the plurality of voxels; and extracting a centerline of the target vessel based on the estimated flow field for the plurality of vessels associated with the target vessel in the medical image by detecting a path that carries maximum flow.
US2017293735	A method for estimating one or more hemodynamic measures of interest for a patient, comprising: generating a personalized anatomical model of vessels of a patient based on patient data; receiving one or more continuous cardiovascular measurements of the patient from a wearable sensor network on the patient; and predicting one or more hemodynamic measures of interest for the patient based on the personalized anatomical model of the vessels of the patient and the one or more.

8.2 FANUC

FANUC

FANUC CORPORATION, Japan is a pioneer in Computer Numerical Control (CNC) technology since 1956.[Source]FANUC's open platform system gives machine tool builders, robot manufacturers, sensor and peripheral device manufacturers the freedom to develop their own applications. The target of the FIELD system(FANUC Intelligent Edge Link & Drive System) is connecting each device within a factory, and also allowing flexibility to connect to upper host systems such as ERP (Enterprise Resource Planning), SCM (Supply Chain Management) and MES (Manufacturing Execution Systems).FANUC has already realized some applications such as LINKi and ZDT and it has developed concepts for machine learning as well as deep learning inspection.[Source]

FANUC and PFN formed an R&D alliance in June 2015, followed by a capital alliance in August of the same year to promote a joint development of AI functions for the manufacturing industry that can efficiently improve the performance and operation rates of FANUC products. The newly developed function utilizes machine-learning (ML) technology to predict and control the variable machining accuracy caused by ROBOCUT's temperature fluctuations, with 30% more accurate compensation than existing method. The new function is applicable from small to large work pieces.[Source]

EXEMPLARY PATENTS/PUBLISHED APPLICATIONS

Patent No.	Claim
US20170357243	A machine learning device for learning a threshold value of detecting an abnormal load in a machine tool, comprising: a state observation unit that observes a state variable obtained based on at least one of information about a tool, main spindle revolution rate, and amount of coolant of the machine tool, material of a work piece, and moving direction, cutting speed, and cut depth of the tool; and a learning unit that learns the threshold value of detecting an abnormal load based on training data created from an output of the state observation unit and data related to detection of an abnormal load in the machine tool and on teacher data.
US2017228644	A machine learning device which detects an operator, communicates with a database registering information concerning the operator, and learns display of an operation menu based on the information concerning the operator, the device comprising: a state observation unit which observes an operation history of the operation menu; and a learning unit which learns the display of the operation menu on the basis of the operation history of the operation menu observed by the state observation unit.
US2017293862	A machine learning device which learns fault prediction of one of a main shaft of a machine tool and a motor which drives the main shaft, comprising: a state observation unit which observes a state variable comprising at least one of data output from a motor controller which controls the motor, data output from a detector which detects a state of the motor, and data output from a measuring device which measures a state of the one of the main shaft and the motor; a determination data obtaining unit which obtains determination data upon determining one of whether a fault has occurred in the one of the main shaft and the motor and a degree of fault; and a learning unit which learns the fault prediction of the one of the main shaft and the motor in accordance with a data set generated based on a combination of the state variable and the determination data.
US2017344909	A machine learning device learning a condition associated with an end-of-life failure of an electronic component in network-connected equipment connected to a network, comprising: a state observation unit that observes a state variable obtained based on at least one of a hardware configuration, manufacturing information, an operating status, a use condition, and an output from a sensor detecting a state of a surrounding environment of the network-connected equipment; a determination data acquisition unit that acquires determination data on determination of presence or absence of the end-of-life failure or a degree of the end-of-life failure of the electronic component in the network-connected equipment; and a learning unit that learns, based on training data created

	from an output from the state observation unit and an output from the determination data acquisition unit, and teacher data, a condition associated with the end-of-life failure of the electronic component in the network-connected equipment.
US2017285584	A machine learning device that learns a control command for a machine by machine learning, comprising: a machine learning unit that performs the machine learning to output the control command; a simulator that performs a simulation of a work operation of the machine based on the control command; and a first determination unit that determines the control command based on an execution result of the simulation by the simulator.
US2017270434	A machine learning apparatus for learning laser machining condition data of a laser machining system, the laser machining system comprising: at least one laser apparatus that includes at least one laser oscillator; at least one machining head that emits a laser beam from the laser apparatus to a work piece; at least one output light detection unit that detects an amount of the laser light emitted from the machining head; at least one reflected light detection unit that detects a reflected light emitted from the machining head and reflected on a surface or near the surface of the work piece to return to the laser apparatus via an optical system in the machining head; at least one machined result observation unit that observes at least one of a machining state and a machined result of the work piece at least during laser machining or after the laser machining; and at least one driving apparatus that changes a relative positional relationship between the machining head and the work piece, the machine learning apparatus comprising: a state amount observation unit that observes a state amount of the laser machining system; an operation result acquisition unit that acquires a machined result of the laser machining system; a learning unit that receives an output from the state amount observation unit and an output from the operation result acquisition unit, and learns the laser machining condition data in association with the state amount of the laser machining system and the machined result; and a decision-making unit that outputs laser machining condition data by referring to the laser machining condition data leaned by the learning unit.
US2017308052	A cell controller for managing a production system having a plurality of industrial machines operated by an operation program, the cell controller comprising: a system operational information analyzer configured to analyze time-series operational information received from the industrial machines via a network, so as to find a part in the system which generates an adverse effect on a cycle time of the entire production system; a state quantity analyzer configured to analyze a state quantity including data of a sensor for detecting a state of the industrial machines, so as to calculate a degree of margin of motion of each industrial machine; a program modifier configured to automatically modify a velocity or acceleration in the operation program based on the degree of margin calculated by the state quantity analyzer; and a simulator configured to execute an operational simulation of the production system in order to confirm a modification result of the operation program. The cell controller further comprises a machine learning unit configured to learn a method for correcting the operation program based on outputs from the system operational information analyzer and the state quantity analyzer, wherein the machine learning unit is configured to carry out reinforcement learning by adding a reward corresponding to the cycle time of the production system to a selected action.

8.3 International Business Machines Corporation (IBM)

International Business Machines Corporation (commonly referred to as IBM) is an American multinational technology company headquartered in Armonk, New York, United States, with operations in over 170 countries.[Source]In 2017, IBM is recognized as a leader for data science platforms. The data and analytical needs of organizations continue to evolve rapidly. Many organizations are extending the breadth of their analytical capability to include data science.[Source]

IBM offers a complete machine learning solution to extract hidden value from enterprise data with IBM Machine Learning for z/OS. This solution helps organizations quickly ingest and transform data to create, deploy and manage high quality self-learning behavioural models using IBM z Systems data, securely in place and in real time, to more accurately anticipate customer and business needs.[Source]

EXEMPLARY PATENTS/PUBLISHED APPLICATIONS

Patent No.	Claim
US2017249746	A computer-based method for segmenting an image to identify a border using supervised machine learning, the method comprising: a segmentation phase including a) accessing an image set with at least one image; b) selecting a discrete number of image sub-sections of the image within a given set of numbers that have been used for generating, in a training phase, a discrete number of training sub-sections of a training image; c) applying a trained classifier to each image sub-section for the discrete number of image sub-sections, the trained classifier representing a probability that the image sub-section is a boundary type; d) outputting of classifiers and generating a probability map then overlaying the probability map on other probability maps generated from other classifiers containing the image sub-section; e) in response to the overlaid trained classifier being above a settable threshold, identifying the image sub-section as a border segment; and repeating a through e until each discrete number of sub-sections in the given set of numbers has been generated for each image in the image set.
US2017115675	A computer implemented method for determining a time to a threshold temperature of an electronic device in a datacenter, the method comprising: measuring with a plurality of sensors a plurality of operating parameters for a first electronic device and the data center; determining a first rate of change of temperature for the first electronic device, the first electronic device being operated with a first workload, the first rate of change of temperature based at least in part on the plurality of operating parameters; comparing the first rate of change to a rate of change threshold; determining that a data center cooling system is operating below a performance threshold in response to the first rate of change being above the performance threshold; determining a first time to a first temperature being above a device threshold, the first temperature associated with the first electronic device, the determination of the first time based at least in part on the first rate of change of temperature and a machine learning model; comparing the first time to a second time, the second time being a time period for restoring the data center cooling system to above the performance threshold; transmitting a warning signal in response to the first time being less than the second time; and determining a cooling capacity to operate the first electronic device to have the first rate of change being equal to or less than the performance threshold.
US2017220942	A method of predicting a hardware device for best program performance, comprising: obtaining a plurality of existing applications and observed performance on a plurality of target hardware devices, each of the plurality of existing applications labeled with one of the plurality of target hardware devices; running the plurality of existing applications on one or more general purpose computer processors and extracting application features from the existing application; inputting the application features, labels associated with the existing applications, and the observed performance on the plurality of target hardware device to a machine learning technique; executing the machine learning technique; and training a predictive model by the machine learning technique for predicting a target hardware device out of the plurality of target hardware devices for running a given application.

8.4 Google

Google LLC was founded in 1998 and is an American multinational technology company that specializes in Internet-related services and products. These include online advertising technologies, search, cloud computing, software, and hardware.[Source]Google Cloud's AI provides modern machine learning services, with pre-trained models and a service to generate your own tailored models. Its neural net-based ML service has better training performance and increased accuracy compared to other large scale deep learning systems.[Source]

Major tech companies have actively reoriented themselves around AI and machine ML: Google is now "AI-first," Uber has ML running through its veins and internal AI research labs keep popping up.[Source]

EXEMPLARY PATENTS/PUBLISHED APPLICATIONS

Patent No.	Claim
US2017161642	A method comprising: determining, based on a lack of movement of a wearable computing device being detected during multiple days of a sample period, a recurring period of time of day when the wearable computing device was not being used; determining, at a time after the sample period and by the wearable computing device, whether a current period of time of day, coincides with the recurring period of time of day; and responsive to determining that the current period of time of day coincides with the recurring period of time of day and responsive to determining that an operation can be completed during the recurring period of time of day, performing, by the wearable computing device, the operation during the period of time of the future day. A machine learning system of the wearable computing device determines the recurring period of time of day when the wearable computing device is not being used.
US20170364833	A system, comprising: a memory that stores computer executable instructions; a processor that executes the computer executable instructions stored in the memory to perform operations comprising: receiving playback information regarding videos streamed by the system to devices, wherein the playback information identifies playback events at the devices and re-buffer events respectively associated with the playback events; identifying features related to quality of the playback events at the devices based on the playback information; determining for each of a plurality of different combinations of the identified features, a probability of a re-buffer event based re-buffer events associated with a respective combination; determining a weighted value for each of the identified features based on the determined probabilities by applying regularization function to the determined probabilities; determining a recommendation of changes to one or more features from the identified features based on the weighted value determined for each of the one or more features, the recommendation for reducing a probability of a re-buffer event; and transmitting, by the system, the recommendation to a client device. The weighted value for each of the identified features includes applying machine learning to the determined probability.
US2017264383	A method comprising: generating, by a mobile computing device, an indicator of a location of the mobile computing device; determining, by an application that interfaces with a premises management system and is executing on the mobile computing device, that the indicator is associated with an anomaly; and providing, by a user interface of the mobile computing device to a user of the mobile computing device, a notice of the anomaly. Receiving, by the mobile computing device from a machine learning system executing on a remote computing device, anomaly criteria, wherein the determination that the indicator is associated with the anomaly is based on the anomaly criteria.

8.5 Facebook

Facebook is an American for-profit corporation and an online social media and social networking service based in Menlo Park, California. The Facebook website was launched on February 4, 2004, by Mark Zuckerberg, along with fellow Harvard College students and roommates, Eduardo Saverin, Andrew McCollum, Dustin Moskovitz, and Chris Hughes.[Source]

Facebook Artificial Intelligence Researchers (FAIR) seek to understand and develop systems with human-level intelligence by advancing the longer-term academic problems surrounding AI. It's research covers the full spectrum of topics related to AI, and to deriving knowledge from data: theory, algorithms, applications, software infrastructure and hardware infrastructure. The Facebook AI Research (FAIR) Residency Program is a one-year research training program with Facebook's AI Research group, designed to give you hands-on experience of machine learning research. Applications for the program are open through January 26, 2018.[Source]

EXEMPLARY PATENTS/PUBLISHED APPLICATIONS

Patent No.	Claim
US2017339442	A computer-implemented method comprising: associating, by a computing system, a region with a first quality level for uploading content; determining, by the computing system, a user is associated with the region; selecting, by the computing system, for the user a first quality level based on the determining; and selecting, by the computing system, for the user a second quality level for uploading content instead of the first quality level in response to at least one of information associated with the user or social engagement signals. A machine learning process based on the information associated with the user and the social engagement signals determines the second quality level.
US2017310776	A method comprising, by one or more computing systems: receiving a request for a location prediction for a user; generating a current location prediction from a plurality of previous location signals, wherein each previous location signal comprises an indication of the user's location at a respective time prior to a predetermined time span, and wherein each previous location signal is weighted based on (1) a type of the previous location signal and (2) a difference between a current time and the respective time for the previous location signal; and sending, in response to the request, the current location prediction for the user to the requesting service. The current location prediction comprises weighting each previous location signal, and wherein the weight applied to each previous location signals is determined via a machine learning algorithm.
US2017308229	A method comprising: by one or more processors associated with a device, determining, out of a plurality of gestures performed on a touch-sensitive area of the device, one or more failed gestures performed by a user attempting to invoke a particular functionality wherein each failed gesture has one or more same conditions associated with its input; by the one or more processors, determining an offset for the one or more failed gestures that would have resulted in successful invocation of the particular functionality; and by the one or more processors, in response to detecting the one or more same conditions, applying the offset to a new gesture to invoke the particular functionality. The machine learning algorithm applies offsets to newly received touch gesture inputs to invoke the particular functionality.

8.6 Intel

Intel Corporation is an American multinational corporation and technology company headquartered in Santa Clara, California, in the Silicon Valley. It is the world's second largest and second highest valued semiconductor chip makers based on revenue after being overtaken by Samsung, and is the inventor of the x86 series of microprocessors, the processors found in most personal computers (PCs).[Source]

In October, 2017 Intel announced the world's first neural network silicon designed for broad enterprise deployment – the Intel® Nervana™ Neural Network Processor (NNP) family. The Intel Nervana NNP's innovative architecture optimizes memory and interconnects to provide more computation capability and better model scalability. It utilizes a new technology called Flexpoint, which maximizes the precision that can be stored within 16 bits, enabling the perfect combination of high memory bandwidth and algorithmic performance for end-user AI applications.[Source]

EXEMPLARY PATENTS/PUBLISHED APPLICATIONS

Patent No.	Claim
US2017185457	A computing device for coprocessor task offloading, the computing device comprising: a sensor management module to receive, by a coprocessor of the computing device, sensor data associated with one or more sensors of the computing device; a sensor profiling module to: (i) detect, by the coprocessor, a plurality of events associated with the sensor data, wherein each of the events is derived from the sensor data; and(ii) determine, by the coprocessor, a resource usage cost value for the coprocessor and a power state transition cost value for the coprocessor associated with the events; a task schedule module to receive, by the coprocessor, an offloaded task request from an application processor of the computing device; and a machine learning module to: (i) determine, by the coprocessor, an aggregate coprocessor load value associated with the plurality of events as a function of a frequency of the events, the resource usage cost value associated with the events, and the power state transition cost value associated with the events; and (ii) determine, by the coprocessor, whether to accept the offloaded task request based on the aggregate coprocessor load value and an estimated coprocessor load value associated with the offloaded task request.
US2017169231	A computing device for elevated risk response, the computing device comprising: a sensor module to monitor, by a trusted execution environment, sensor data from a plurality of sensors of the computing device; a risk classifier module to apply, by the trusted execution environment, a machine-learning classifier to the sensor data to identify an elevated risk of malicious attack to the computing device; and a risk actuator module to trigger, by the trusted execution environment, a security response in response to identification of the elevated risk.
US2017230394	A system for snapshot evaluation and user behavior classification, comprising: a processor; memory circuitry to store at least one user profile; communication circuitry to: receive user data associated with a user of a device; and receive a snapshot of operation of the device, the snapshot to identify at least one active operation in the device and at least one planned operation in the device at the time the snapshot was generated; and a user behavior classification engine to: identify a classification of user behavior based, at least in part, on the received snapshot and the received user data; identify a user profile associated with the user; generate a model configuration based on the classification; and generate a threat analysis indicating whether the device comprises a potential threat based, at least in part, on a comparison between the model configuration and the received snapshot.

8.7 Yandex

Yandex is a technology company that builds intelligent products and services powered by machine learning. Its goal is to help consumers and businesses better navigate the online and offline world. Since 1997, it has delivered world-class, locally relevant search and information services.Yandex, has 17 offices worldwide, has been listed on the NASDAQ since 2011.[Source]

Internet, June 1, 2017. Yandex and Prosveshcheniye, known as Russia's largest educational publisher, recently agreed to form a joint venture to develop a digital education platform for Russian schools.Yandex and Prosveshcheniye Holding will each invest approximately one million US dollars (in roubles) to the joint venture by the end of this year. Yandex is excited to contribute its machine learning technologies to the project including computer vision and speech recognition among others.[Source]

EXEMPLARY PATENTS/PUBLISHED APPLICATIONS

Patent No.	Claim
US20170364810	A computer implemented method of generating a training object for training a machine learning algorithm, the training object including a digital training document and an assigned label, the method executable at a training server, the method comprising: acquiring the digital training document to be used in the training; transmitting, via a communication network, the digital training document to a plurality of assessors, transmitting further including indicating a range of possible labels for the assessors to assess from the range of possible labels including at least a first possible label and a second possible label; obtaining from each of the plurality of assessors a selected label to form a pool of selected labels; generating a consensus label distribution based on the pool of selected labels, the consensus label distribution representing a range of perceived labels for the digital training document and an associated probability score for each of the perceived labels; and training the machine learning algorithm using the digital training document and the consensus label distribution.
US2017293859	A computer implemented method for training a search ranker, the search ranker being configured to ranking search results, the method being executable at a server associated with the search ranker, the method comprising: retrieving, by the server, a training dataset including a plurality of training objects, each training object within the training dataset having been assigned a label and being associated with an object feature vector; for each training object, based on the corresponding associated object feature vector: determining a weight parameter, the weight parameter being indicative of a quality of the label; determining a relevance parameter, the relevance parameter being indicative of a moderated value of the labels relative to other labels within the training dataset; training the search ranker using the plurality of training objects of the training dataset, the determined relevance parameter for each training object of the plurality of training objects of the training dataset, and the determined weight parameter for each object of the plurality of training objects of the training dataset to rank a new document. The search ranker is configured to execute a machine learning algorithm and wherein training the search ranker comprises training the machine learning algorithm.
US2017299772	A method of generating a weather forecast, the method executable on a server, the server including a processor and a machine learning module, the method comprising: receiving, by the machine learning module, at least one current weather measurement parameter, the at least one current weather measurement parameter being a weather parameter at a measurement time; receiving, by the machine learning module, a first average value of a historical weather parameter for the measurement time; generating, by the machine learning module, a normalized value of the weather measurement parameter based on a difference between the current weather measurement parameter and the first average value of the historical weather parameter for the measurement time; training the machine learning module to create a normalized value of a weather forecasting parameter based on, at least partially, the normalized value of the weather measuring parameter, the normalized value of the wseather forecasting parameter being associated with a future forecasting time, the future forecasting time occurring after the measurement time.

8.8 Microsoft

Microsoft Corporation is an American multinational technology company with headquarters in Redmond, Washington. It develops, manufactures, licenses, supports and sells computer software, consumer electronics, personal computers, and services. Microsoft was founded by Paul Allen and Bill Gates on April 4, 1975.[Source]

The goal of Microsoft Machine Learning Services is to provide an extensible, scalable platform for integrating machine learning tasks and tools with the applications that consume machine learning services. The platform must serve the needs of all users involved in the data development and analytics process, from data scientists, to architects and database administrators.[Source] In year 2017, Microsoft launched three machine learning tools namely, the Azure Machine Learning Experimentation service, the Azure Machine Learning Workbench and the Azure Machine Learning Model Management service.[Source]

EXEMPLARY PATENTS/PUBLISHED APPLICATIONS

Patent No.	Claim
US2017277810	A system comprising: at least one processor; and memory coupled to the at least one processor, the memory comprising computer executable instructions that, when executed by the at least one processor, performs a method for determining user contact relevancy, the method comprising: receiving event data from a client device of a user; processing the event data to determine information identifying the user; generating one or more queries based on the information identifying the user; providing the one or more queries to one or more data sources, the one or more data sources comprising user contact data for the user; receiving response data from the one or more data sources; deriving one or more context signals from the response data; using the one or more context signals to calculate one or more user contact relevance metrics; and providing a user contact list based on the one or more user contact relevance metrics. The one or more context signals comprises using machine learning to identify at least one of behavioral patterns and contextual relationships for the user.
US2017323174	A computer-implemented process for evaluating images of meals, comprising: using a computer to perform process actions for: receiving a meal image of a single meal consisting of multiple food items; wherein one or more of the food items are occluded in the meal image; receiving information indicating a source of the meal; recognizing one or more of the visible food items and one or more of the occluded food items in the meal by evaluating the meal image using a machine-learned meal model that is constrained by the source of the meal; and presenting one or more interactive messages automatically generated based on the recognized meal.
US20170364376	A system, comprising: a reference component configured to access a set of metadata correlated with configuration functions of a computer application; an indexing component configured to distinguish respective subsets of the set of metadata that are associated with respective ones of the configuration functions; and a searching component configured to receive a set of search data, compare the set of search data with the subsets of the set of metadata, and identify a matching subset of metadata that satisfies a condition pertaining to the search data defined by a function. The system further includes, a user history component configured to track user configuration function activity relative to user use of the computer application and record user configuration function activity at least as a function of time and of computer application; and a machine learning component configured to analyze recorded user configuration function activity and to weight the configuration functions in response to the analysis and modify the condition or the function of time and computer application via the weights.

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