LatentView
Actionable Insights • Accurate Decisions

Deep Learning - Framework

Chapters

What is Deep Learning?

Deep Learning is a subset of machine learning in artificial intelligence (AI)

Deep learning - also called as deep neural learning or deep neural network, has networks capable of learning that can be supervised, semi-supervised and unsupervised from data that is unstructured or unlabelled. These algorithms use multiple layers to progressively extract higher level features from raw input

What is Neural Network?

- An artificial neuron network (ANN): It is a computational model based on the structure and functions of biological neural networks
- ANNs are considered nonlinear statistical data modeling tools where the complex relationships between inputs and outputs are modeled or patterns are found

Why Neural Network?

- More efficient and accurate than other traditional algorithms techniques
- ANN can be used for both - Supervised and Unsupervised learning
- It can be used for both Unstructured and Structured data
- Works with more accuracy and efficiency for unstructured data

Where Neural Networks are used?

- Used in pattern recognition because of their ability to generalise and to respond to unexpected inputs/patterns
- Problems for which algorithmic method is expensive or does not exist
- Neural networks can learn by example, hence we do not need to program it, to that extent

Challenges

- Computation time is more
- Requires additional devices for processing support
- Neural Network is still a black box model - it is hard to look "into" the network and figure out exactly what it has learnt

Deep Learning vs. Machine Learning

Overview

Artificial Intelligence

- Developing systems which have the ability to learn and reason like humans
- Science of making intelligent machines that can perform tasks like or even better and faster then humans can

Machine Learning

Machine Learning is the study of algorithms that

- Improves their performance P
- At some task T
- with experience E

Deep Learning

A subfield of Machine Learning that is concerned with algorithms called artificial neural networks, which are inspired by the structure and function of brain

Customer Segmentation

Optimization

Handwriting Recognition

Types of Machine Learning

Supervised Learning

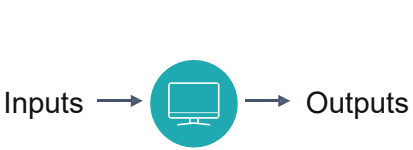
- Makes machine learn explicitly
- Data with clearly defined output is given
- Predicts outcome/future
- Resolves classification & regression problems

Unsupervised Learning

- Machine understands the data (identifies patterns/structures)
- Evaluation is qualitative or indirect
- Does not predict/find anything specific

Reinforcement Learning

- An approach to AI
- Reward based learning
- Learning from +ve & -ve reinforcement
- Machine learns how to act in a certain environment
- To maximize rewards



Application Areas of Deep Learning

Key areas where Neural Networks plays a significant role

Language Processing

Text analytics refers to a discipline of computer science that **combines machine learning and natural language processing (NLP)** to draw meaning from unstructured text documents.

Computer Vision

Computer vision is concerned with the theory and technology for building artificial systems that obtain information from images or multi-dimensional data.

Multi Channel Attribution

"Multi-touch attribution" refers to the martech attribution solution that tracks a series of touchpoints through the funnel and assigns revenue credits to those touchpoints.

Video Analytics

Video Analytics uses mathematical algorithms to monitor, analyze and manage large volumes of video. It digitally analyzes video inputs; transforming them into intelligent data which helps in taking decisions.

Collaborative Filtering

Collaborative filtering is a method of making automatic **predictions** (filtering) about the interests of a **user** by collecting preferences or **taste** information from **many users** (collaborating).

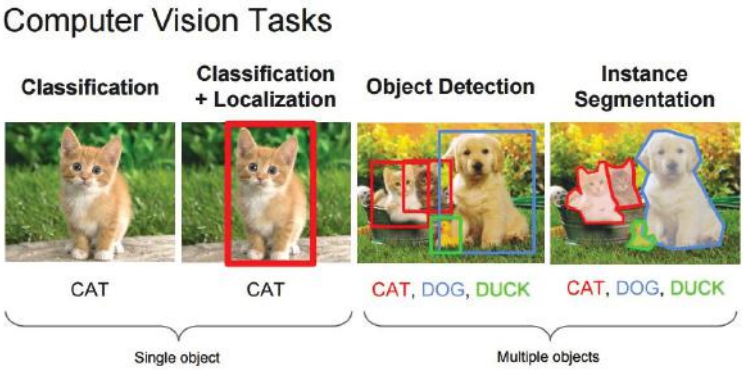
Cognitive Computing

Cognitive computing process uses a blend of artificial intelligence, neural networks, machine learning, natural language processing, sentiment analysis and contextual awareness to solve day-to-day problems just like humans.

Computer Vision in Deep Learning

Introduction to Computer Vision

Computer Vision seeks to develop techniques to help computers “see” and understand the content of digital images such as photographs and videos.



Computer vision works in three basic steps:

Acquiring an image

Images, even large sets, can be acquired in real-time through video, photos or 3D technology for analysis.

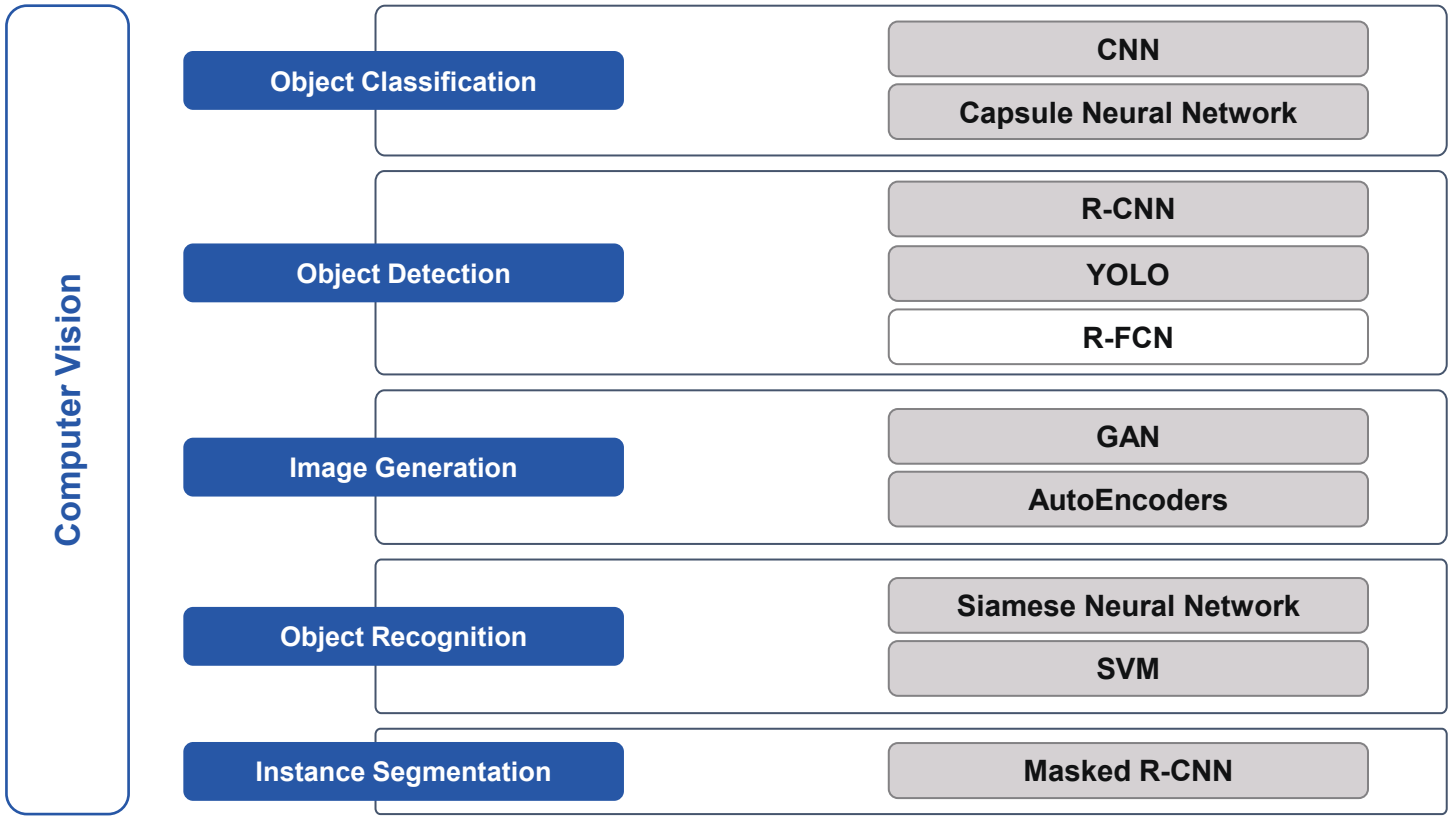
Processing the image

Deep learning models automate much of this process, but the models are often trained by first being fed thousands of labeled or pre-identified images.

Understanding the image

The final step is the interpretative step, where an object is identified or classified.

Popular Models for Computer Vision



Language Processing in Deep Learning

Introduction to Language Processing

Natural Language Processing (NLP) is a branch of AI “that deals with human-computer interaction through natural (human) languages”. NLP trains computers to understand, decipher and manipulate human languages: spoken and written

Natural Language Understanding: Involves interpretation of language. Examples: HomePod, Alexa and Google Assistant

Natural Language Generation: Involves producing meaningful language as output. Examples: Automatic captions in YouTube, chatbots, automated journalism (Associated Press)

Ambiguity in spoken/written language is the main challenge in NLP

- Meaning of words change depending on the context
- Meaning based on punctuation
- Detecting attitude/intention: anger, sadness, sarcasm, irony

Homepod

Handwriting Recognition

Spam classification

Language Processing consists of 5 major steps

1 Pre-processing text:

clean text, remove special characters and stop-words

2 N-grams:

Find words that frequently occur together

3 Sentiment analysis:

Examine text to understand opin-ions(positive, negative or neutral) expressed within text

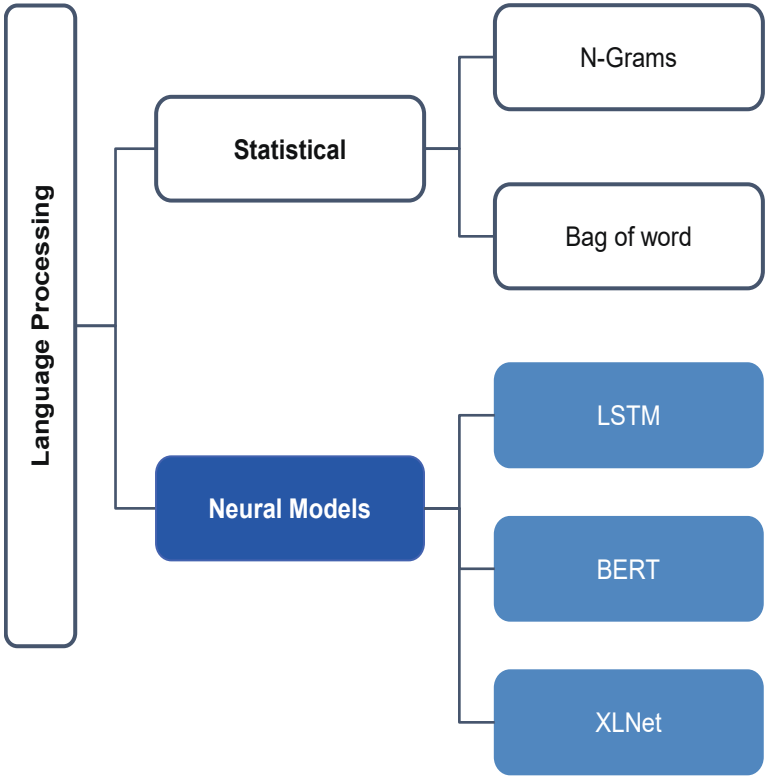
4 Topic Modeling:

Identify main themes discussed within the text

5 Evaluating results:

Take business decisions based on output from sentiment analysis and topic modeling

Language processing: Statistical vs. Neural Models



Advantages of Neural Model over traditional statistical models

Contextual Information is captured

Machine learning models are designed to make the most accurate predictions possible. Statistical models are designed for inference about the relationships between variables

Deep Learning does much better than statistical methods on unstructured data (video, sound, text, pictures)

Cognitive Computing

Introduction to Cognitive Computing

Cognitive computing is the use of computerized models to simulate the human thought process in complex situations where the answers may be ambiguous and uncertain. The phrase is closely associated with IBM's cognitive computer system, Watson.

01 Based on the scientific disciplines of artificial intelligence and signal processing

02 Platform uses machine learning, reasoning, natural language processing, speech recognition and vision, human computer interaction, dialog and narrative generation, among other technologies

03 Cognitive computing improve human decision-making

Meal Planning

04 More accurate models of how the human brain/mind senses, reasons, and responds to stimulus

05 Cognitive computinga applications adjust content for a particular type of audience

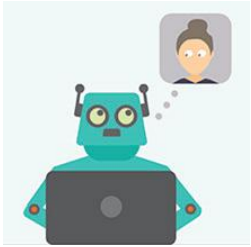
06 Cognitive computing applications are more affective and more influential by design

Key Attributes of Cognitive System

Adaptive	Interactive	Iterative	Stateful	Contextual
Adaptive systems which learn as information changes, and as goals and requirements evolve	Systems which interact with other processors, devices, cloud services, as well as with people	Iterative process to solve problems which are ambiguous	provides information that is suitable for the specific application at that point of time	Understand, identify, and extract contextual elements

Cognitive Computing mimic's human brain's reasoning process

COGNITIVE COMPUTING		ARTIFICIAL INTELLIGENCE
Machine learning, natural language processing, neural networks, deep learning, sentiment analysis	**Technology**	Machine learning, natural language processing, neural networks, deep learning
Simulate human thought processes to assist humans in finding solutions to complex problems	**Capabilities**	Find patterns in big data to learn and either reveal hidden information or deliver solutions to complex problems
Augment human capabilities	**Purpose**	Automate processes
Customer service, healthcare, industrial sector	**Industries**	Finance, security. healthcare, retail, manufacturing, government



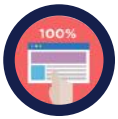
Multi Touch Attribution

Introduction to Multi Channel Attribution

Multi-channel attribution is a set of rules that assigns credit for sales and revenue to touch points across the customer journey.The purpose of attribution is to help marketers understand what marketing actions and touchpoints influence revenue and conversions.

Attribution models

Last touch



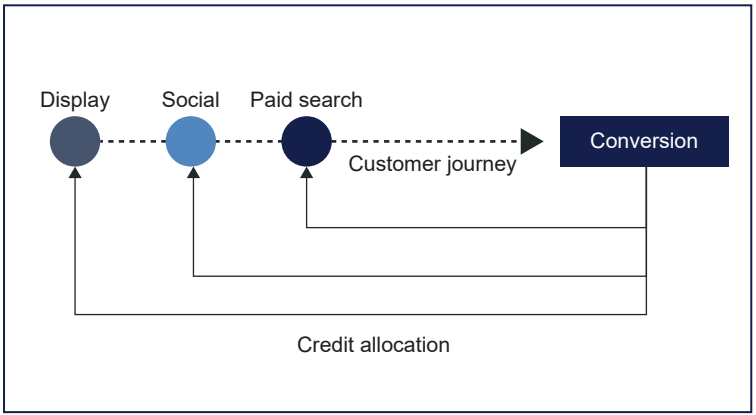
First touch

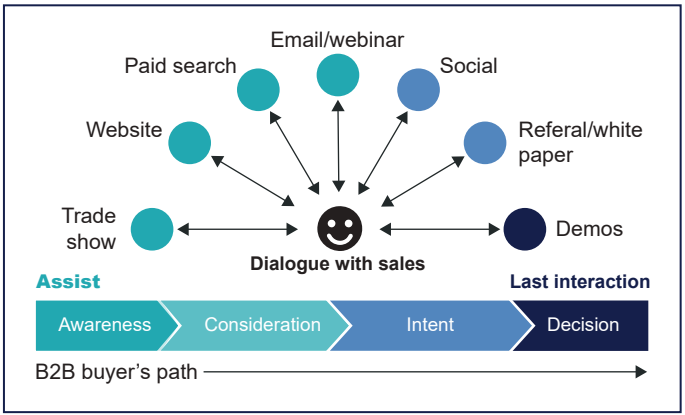
Time decay

Linear

Position based

Examples





Introduction to Multi Channel Attribution

Growth

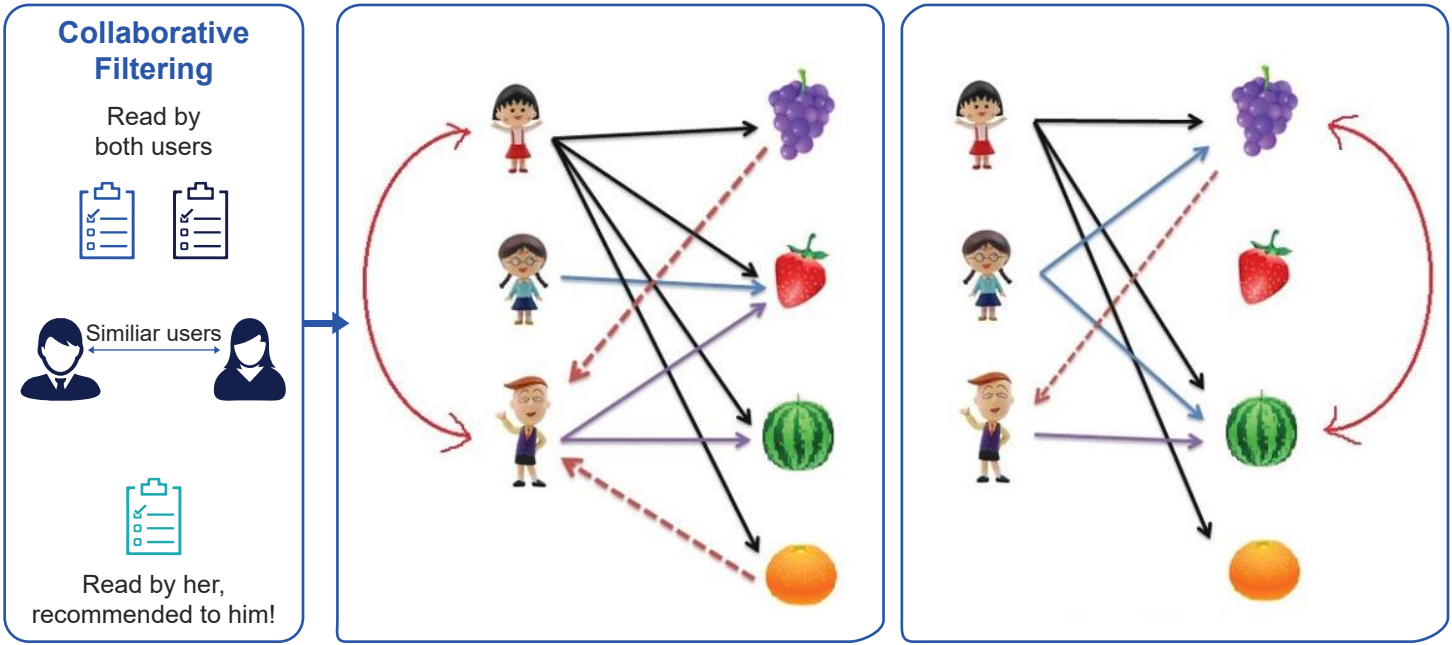
Efficiency

	HOW IT WORKS	PROS	CONS
First Touch	Assigns 100% of credit to first AdWords touch point	Maximize TOFU credit distribution. Favors customer acquisition	Favors highly competitive terms — likely to be inefficient
U-shaped (position based)	Assigns 40% of credit to first + last touch point. Distributes remaining 20% evenly	Emphasizes key touches while giving some credit to early efforts	Can undervalue middle touch points, especially for long purchase cycle
Linear	Every touch point is assigned equal credit	Every touch point is considered	Undervalues key touch points, over values minor touch points
Time decay	Bulk of credit assigned to last touch, diminishing value assigned to earlier points	High efficiency while distributing some credit to TOFU	Overvalues last touch efforts (brand, remarketing)
Last click	The worst Jerry, the worst	Maximize efficiency	Significantly overvalues brand terms, remarketing. Favors customer recycling

Collaborative Filtering

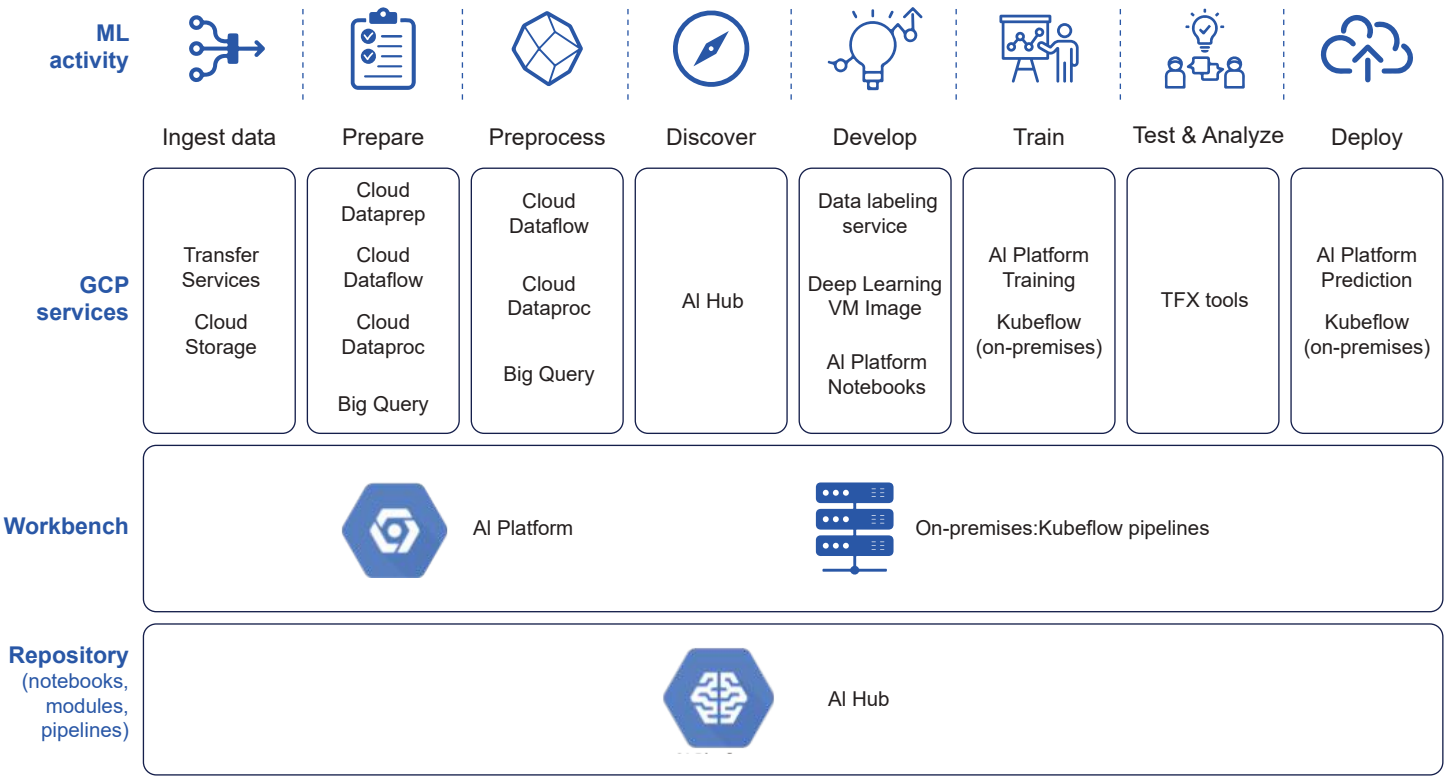
Introduction to Collaborative Filtering

Collaborative filtering is a technique of recommendation engine that can filter out items that a user might like on the basis of reactions by similar users.



Guide to deployment of models

Machine learning development: the end-to-end cycle



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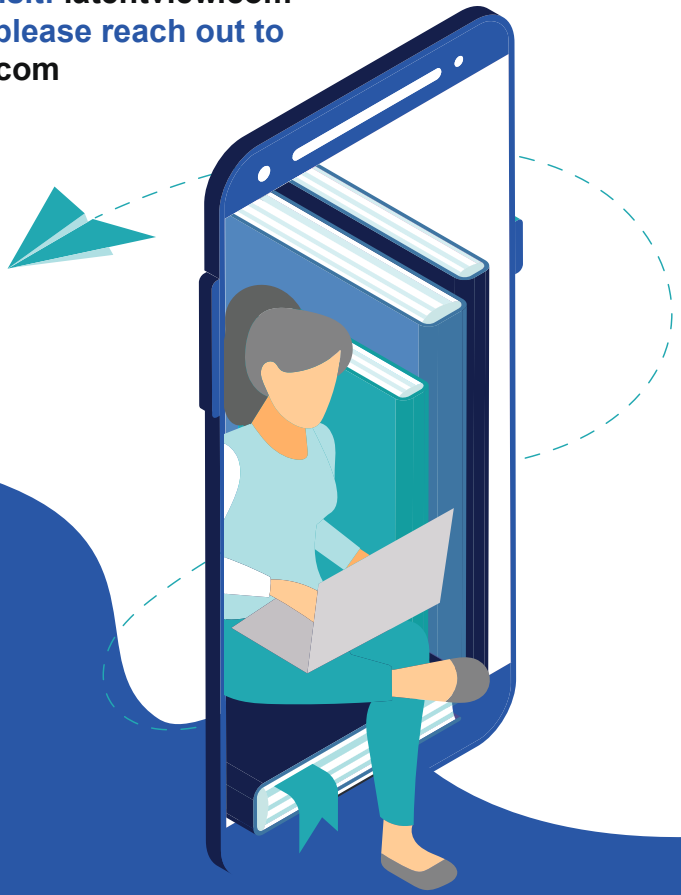

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