How to Write a Publishable Research Paper

Workshop by Dawn Henwood, PhD

Clarity STUDIO

Three Quick Questions to Get Us Started


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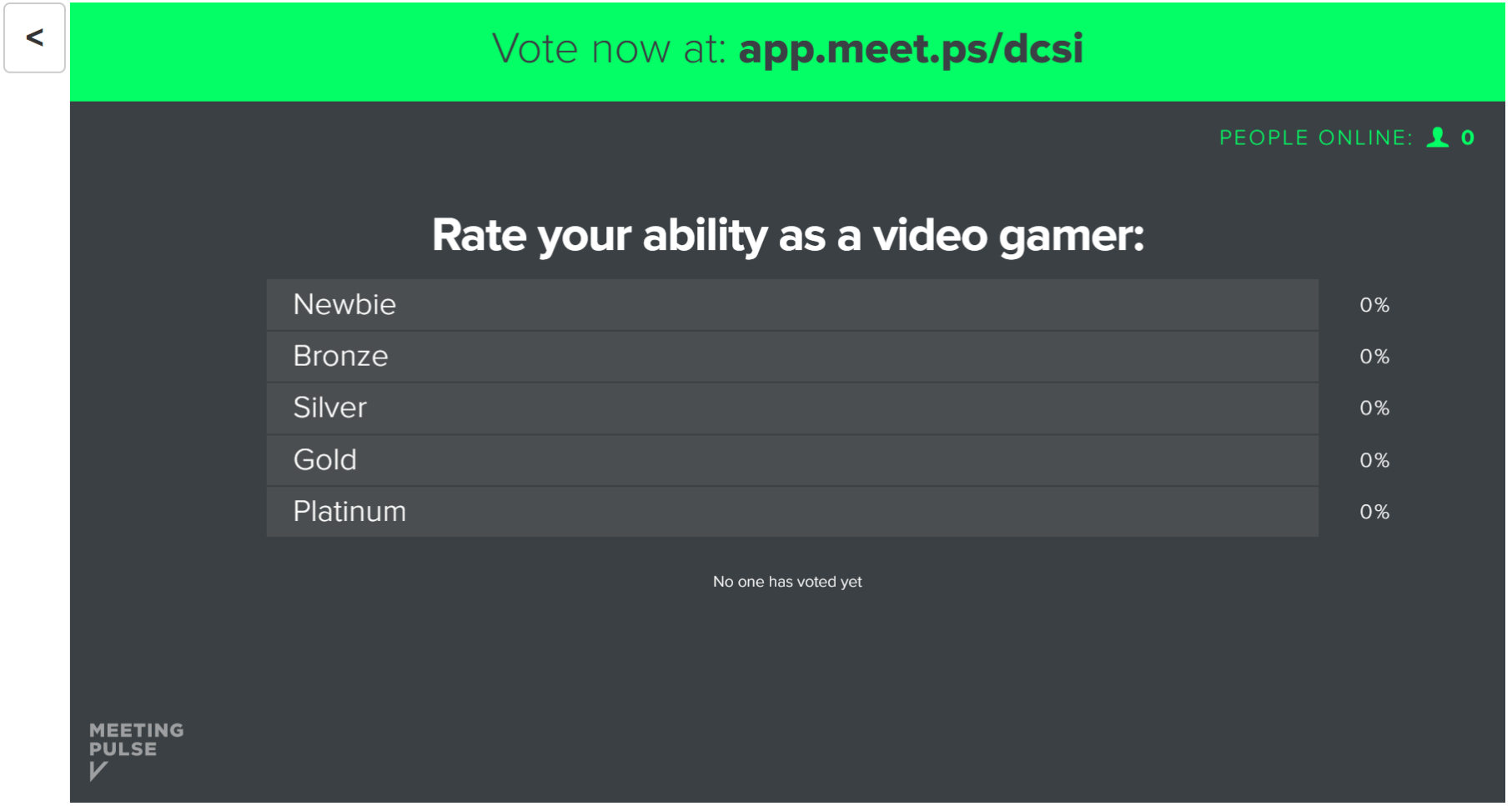
What's the first word that comes to mind when you think about writing a research paper?

No one has voted yet

MEETING PULSE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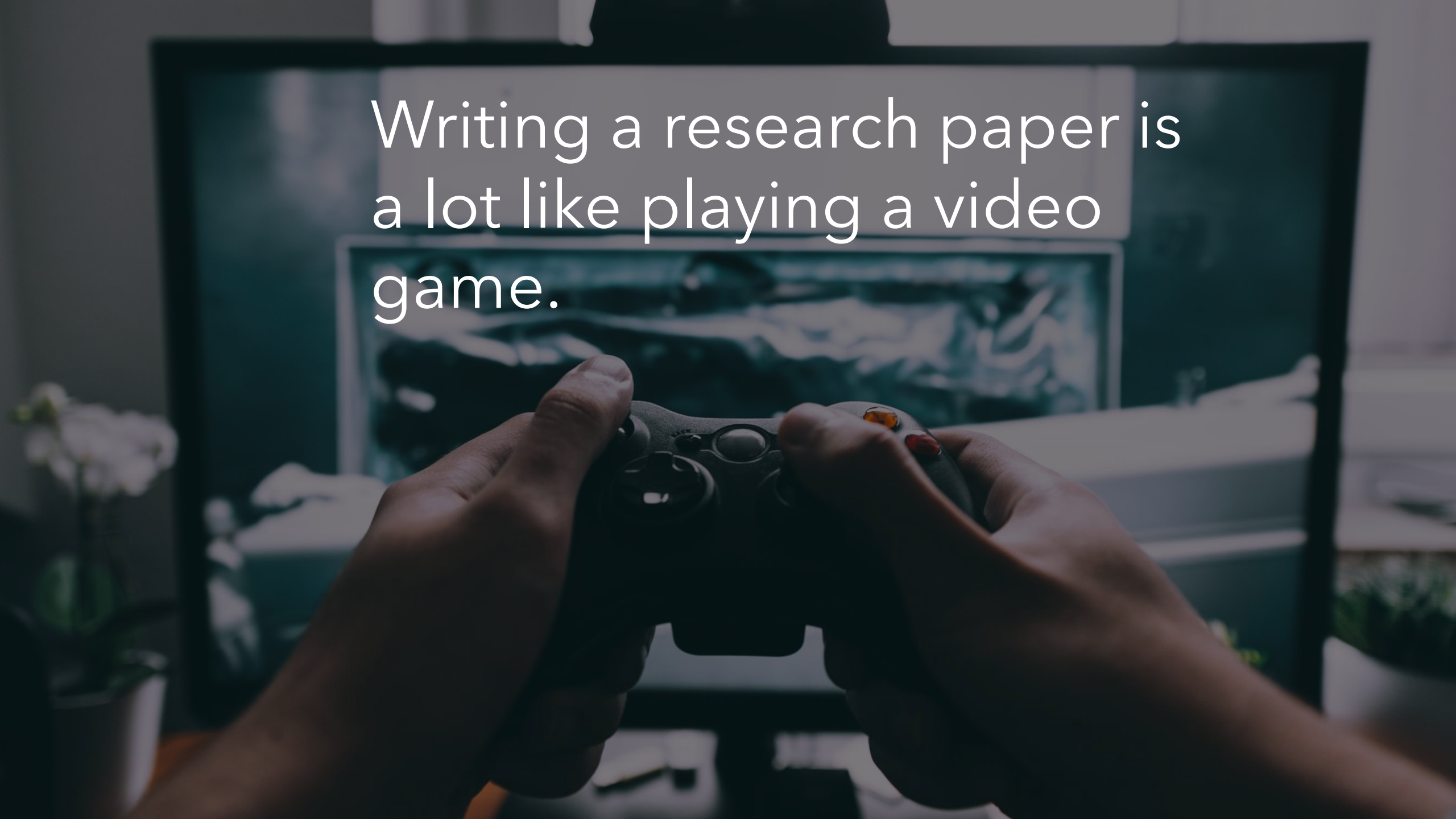
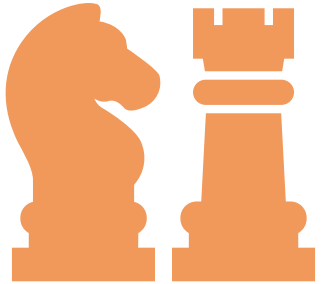
MEETING PULSE


Writing a research paper is a lot like playing a video game.

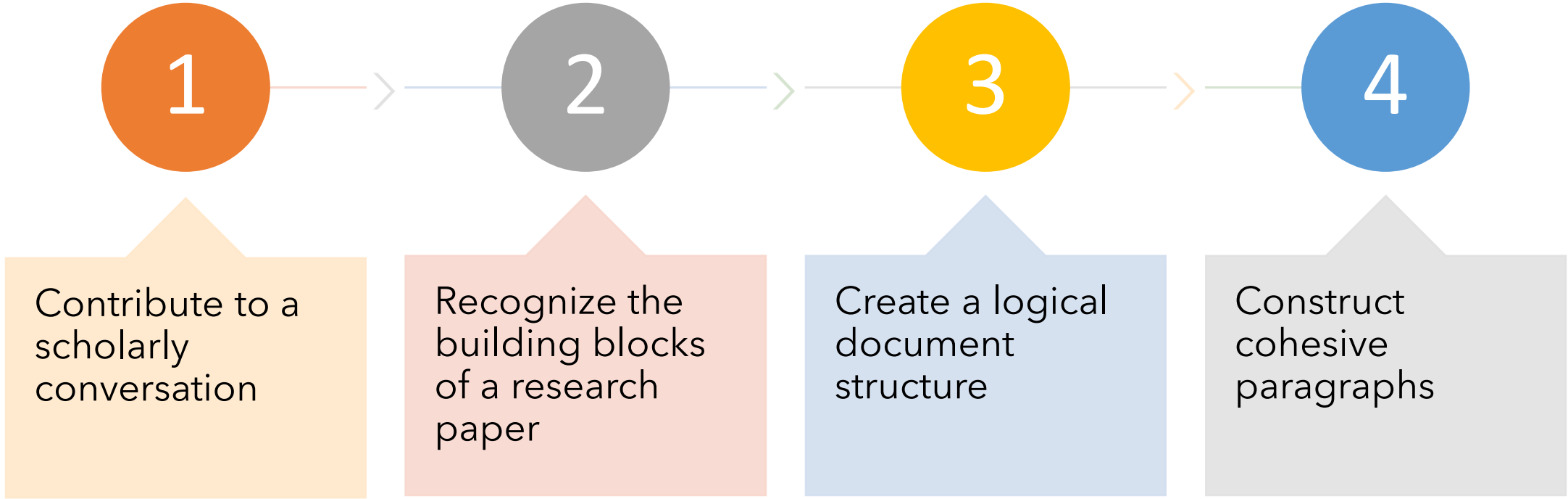
Today's Mission

To conquer the "rules" governing the structure of a research paper in computer science.



To make the game of writing a research paper easier to play (and win!).

You'll learn how to:

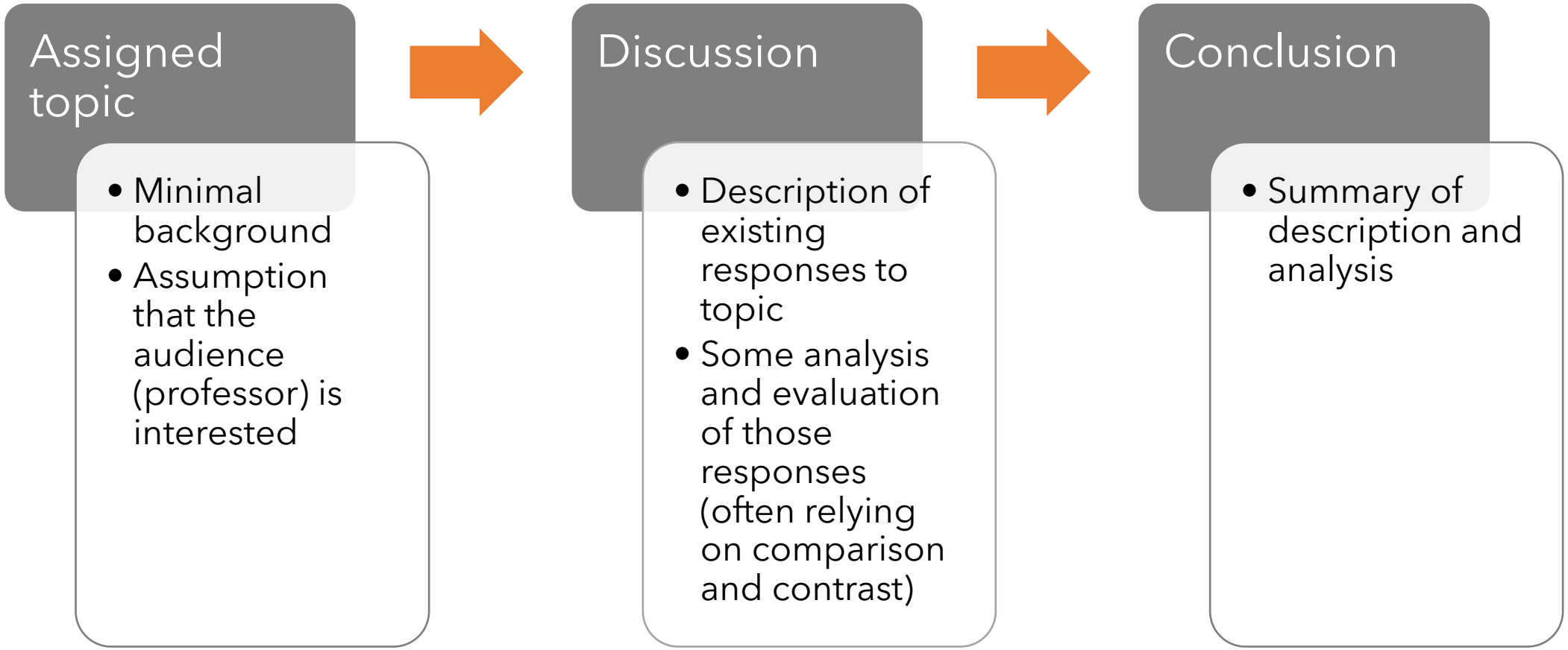


1. How to contribute to a scholarly conversation

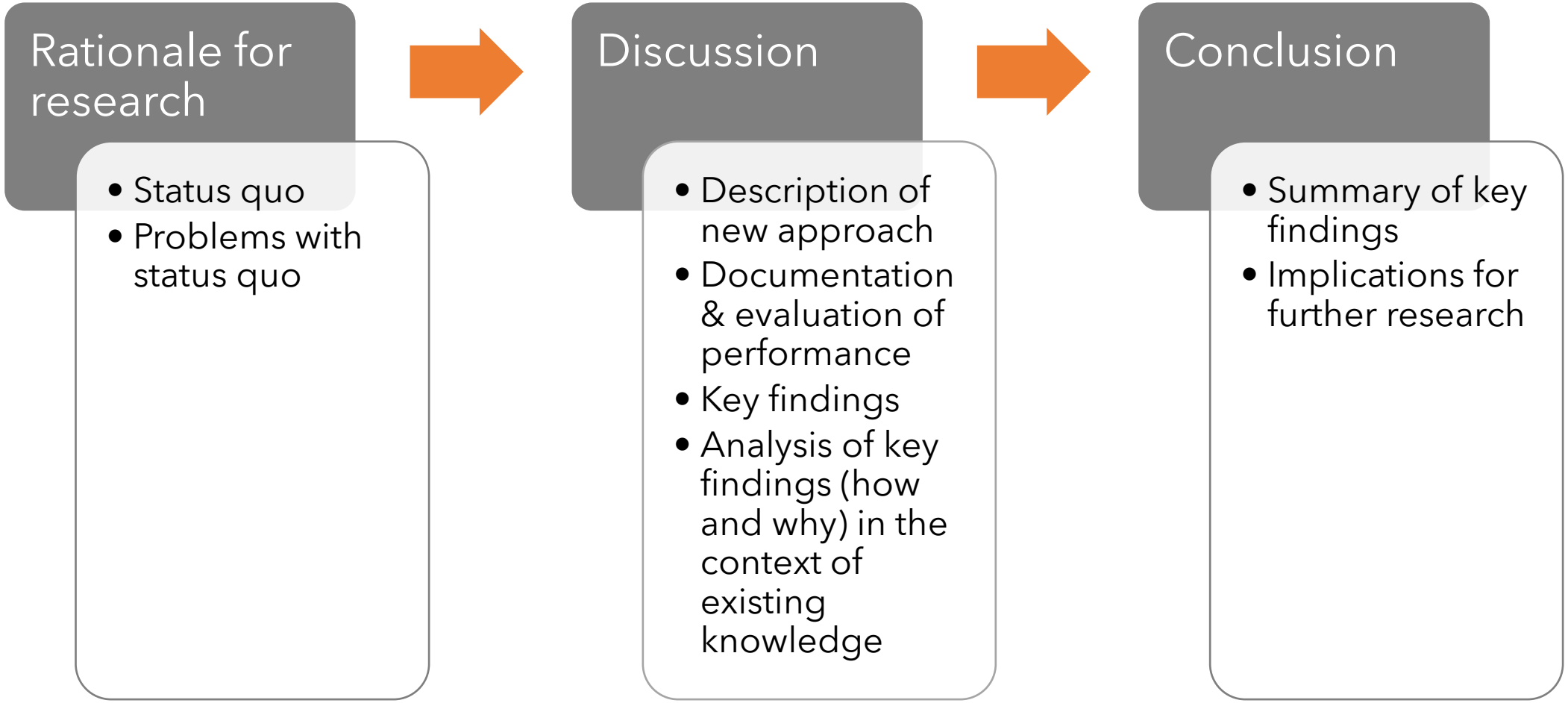

Writing a publishable paper is like entering a global conversation that's been going on for years.

A publishable paper is NOT the same as a course essay

A **course essay** explores ideas within a defined context



A **research paper** presents new knowledge to a broad community



A Case Study of the Augmentation and Evaluation of Training Data for Deep Learning (Ding et al., *ACM Journal of Data and Information Quality*, 2019)

A Case Study of the Augmentation and Evaluation of Training Data for Deep Learning

JUNHUA DING, University of North Texas, USA
XINCHUAN LI and XIAOJUN KANG, China University of Geosciences (Wuhan), China
VENKAT N. GUDIVADA, East Carolina University, USA

Deep learning has been widely used for extracting values from big data. As many other machine learning algorithms, deep learning requires significant training data. Experiments have shown both the volume and the quality of training data can significantly impact the effectiveness of the value extraction. In some cases, the volume of training data is not sufficiently large for effectively training a deep learning model. In other cases, the quality of training data is not high enough to achieve the optimal performance. Many approaches have been proposed for augmenting training data to mitigate the deficiency. However, whether the augmented data are "fit for purpose" of deep learning is still a question. A framework for comprehensively evaluating the effectiveness of the augmented data for deep learning is still not available. In this article, we first discuss a data augmentation approach for deep learning. The approach includes two components: the first one is to remove noisy data in a dataset using a machine learning based classification to improve its quality, and the second one is to increase the volume of the dataset for effectively training a deep learning model. To evaluate the quality of the augmented data in fidelity, variety, and veracity, a data quality evaluation framework is proposed. We demonstrated the effectiveness of the data augmentation approach and the data quality evaluation framework through studying an automated classification of biology cell images using deep learning. The experimental results clearly demonstrated the impact of the volume and quality of training data to the performance of deep learning and the importance of the data quality evaluation. The data augmentation approach and the data quality evaluation framework can be straightforwardly adapted for deep learning study in other domains.

CCS Concepts: • **Computing methodologies** → **Machine learning**; **Cross-validation**;

Additional Key Words and Phrases: Data quality, machine learning, support vector machine, convolutional neural network, deep learning, diffraction image

ACM Reference format:
Junhua Ding, Xinchuan Li, Xiaojun Kang, and Venkat N. Gudivada. 2019. A Case Study of the Augmentation and Evaluation of Training Data for Deep Learning. *J. Data and Information Quality* 11, 4, Article 20 (August 2019), 22 pages.
https://doi.org/10.1145/3317573

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The authors would like to thank Dr. Xin-Hua Hu, Jiabing Wang, Min Zhang, and Pruthvish Patel at East Carolina University for assistance with the experiments. This research is supported in part by grants #1560037, #1730568, and #1852249 from the National Science Foundation.
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- Deep learning requires a large amount of training data, and that data must be of high quality.
- Since we haven't yet figured out how to meet both these conditions, various approaches have been proposed for augmenting the training data.
- Those approaches are missing a way to evaluate the quality of the augmented data.
- This article describes a new approach that improves the quality and quantity of augmented data.
- The approach has been tested on an automated classification of biology cell images and holds promise for deep learning in other domains.

Your readers are wondering:

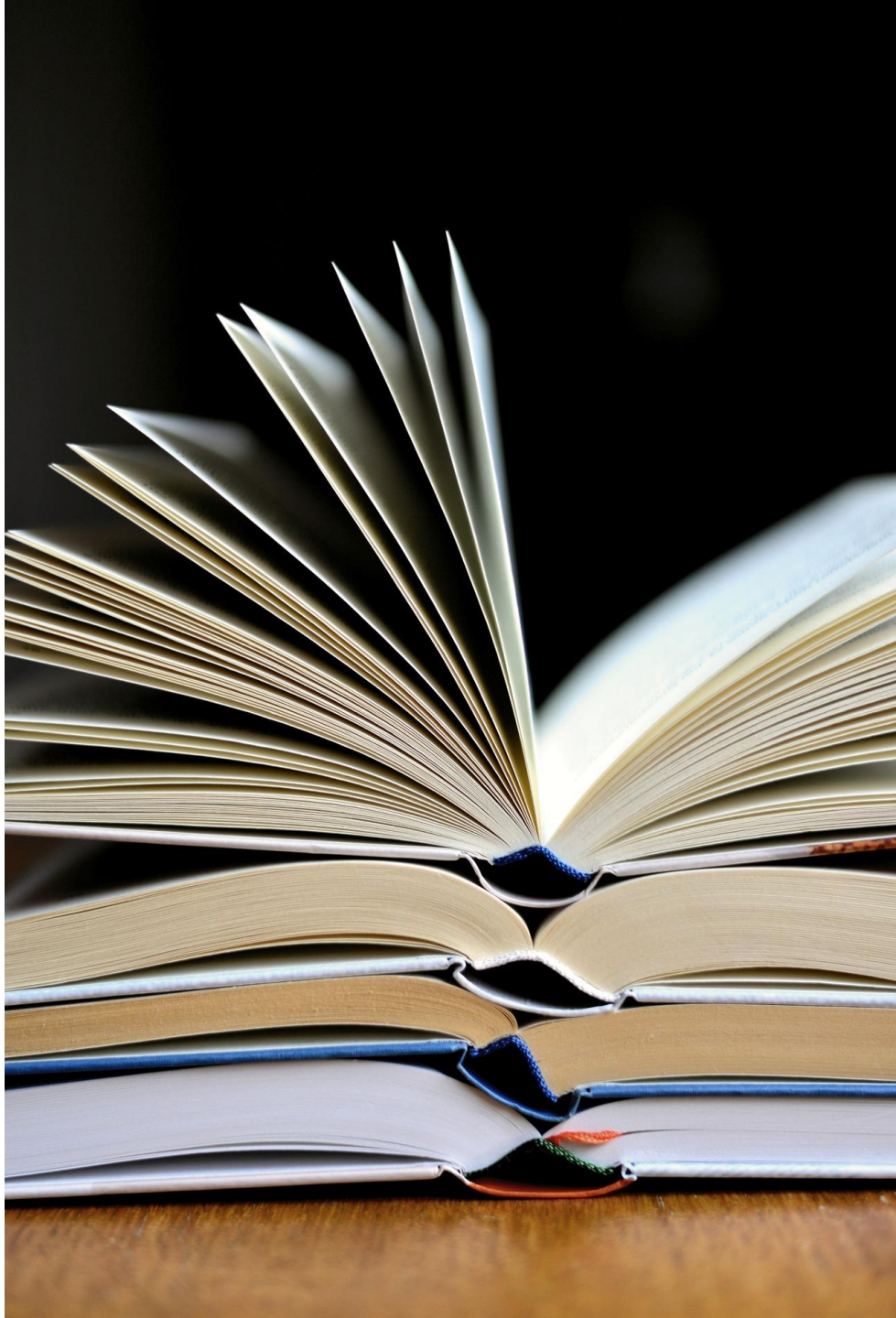
- Why did you do what you did? (Who cares?)
- What exactly did you do, and how did you do it? (Can I trust your work?)
- What did you learn? (How have you advanced the field of knowledge?)
- So what? (Why does your work matter? What are the implications for future learning?)

2. Recognize the building blocks of a research paper

What kind of paper are you writing? (What kind of game are you playing?)

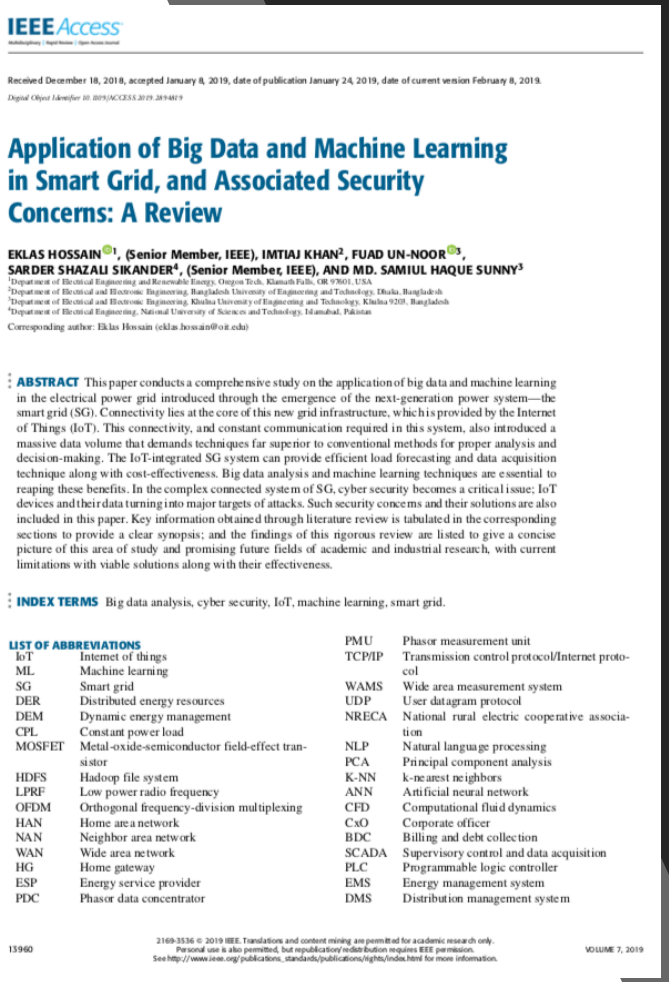
Common types of publishable papers

- Survey
- Literature review
- Introduction of a new theoretical framework, model, process, or device




Writing GOALS
determine structure

Structure for a **survey or review**



IEEE Access

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Digital Object Identifier 10.1109/ACCESS.2019.2894819

Application of Big Data and Machine Learning in Smart Grid, and Associated Security Concerns: A Review

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ABSTRACT This paper conducts a comprehensive study on the application of big data and machine learning in the electrical power grid introduced through the emergence of the next-generation power system—the smart grid (SG). Connectivity lies at the core of this new grid infrastructure, which is provided by the Internet of Things (IoT). This connectivity, and constant communication required in this system, also introduced a massive data volume that demands techniques far superior to conventional methods for proper analysis and decision-making. The IoT-integrated SG system can provide efficient load forecasting and data acquisition technique along with cost-effectiveness. Big data analysis and machine learning techniques are essential to reaping these benefits. In the complex connected system of SG, cyber security becomes a critical issue; IoT devices and their data turning into major targets of attacks. Such security concerns and their solutions are also included in this paper. Key information obtained through literature review is tabulated in the corresponding sections to provide a clear synopsis; and the findings of this rigorous review are listed to give a concise picture of this area of study and promising future fields of academic and industrial research, with current limitations with viable solutions along with their effectiveness.

INDEX TERMS Big data analysis, cyber security, IoT, machine learning, smart grid.

LIST OF ABBREVIATIONS

IoT	Internet of things
ML	Machine learning
SG	Smart grid
DER	Distributed energy resources
DEM	Dynamic energy management
CPL	Constant power load
MOSFET	Metal-oxide-semiconductor field-effect transistor
HDFS	Hadoop file system
LPRF	Low power radio frequency
OFDM	Orthogonal frequency-division multiplexing
HAN	Home area network
NAN	Neighbor area network
WAN	Wide area network
HG	Home gateway
ESP	Energy service provider
PDC	Phasor data concentrator
PMU	Phasor measurement unit
TCP/IP	Transmission control protocol/Internet protocol
WAMS	Wide area measurement system
UDP	User datagram protocol
NRECA	National rural electric cooperative association
NLP	Natural language processing
PCA	Principal component analysis
K-NN	k-nearest neighbors
ANN	Artificial neural network
CFD	Computational fluid dynamics
CxO	Corporate officer
BDC	Billing and debt collection
SCADA	Supervisory control and data acquisition
PLC	Programmable logic controller
EMS	Energy management system
DMS	Distribution management system

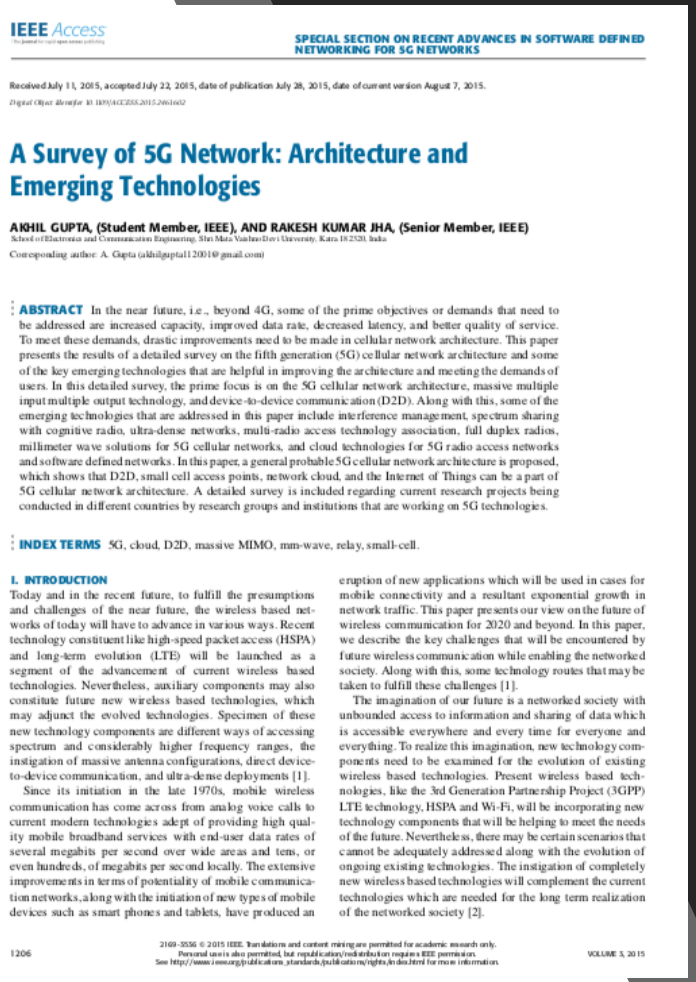
Application of Big Data and Machine Learning in Smart Grid, and Associated Security Concerns: A Review (Hossain et al., *IEEE Access*, 2018)

- Description of how big data and machine learning are being applied in the smart grid
- Cyber security issues that accompany use of IoT technologies
- Solutions to the security issues
- Possibilities for future academic and industrial research

TABLE 8. Application of machine learning techniques in smart grids with renewable energy sources.

Reference	Institute	Year	Machine learning strategy	Technique	Application
Xu et al. [117]	Hong Kong Polytechnic University, Hong Kong (with external collaboration)	2011	Data categorization	Extreme learning machine	Assessment model for analyzing transient stability
Wang et al. [118]	Wuhan University, China (with external collaboration)	2016	Classification	Core vector machine (CVM)	Analyzing transient stability
Li et al. [128]	The University of Oklahoma, USA	2011	Pattern recognition	Machine learning	Finding out customer usage pattern and preferences
Alshareef et al. [130]	University of Ontario Institute of Technology, Canada	2014	Detection & Classification	Machine learning and wavelet design	Islanding detection in distributed generation systems
Jiang et al. [131]	National Renewable Energy Laboratory, USA (with external collaboration)	2017	Optimization	Particle swarm optimization	Enhancing stability for unplanned islanding in microgrid
Jurado et al. [132]	Sensing & Control Systems, Spain (with external collaboration)	2015	Data categorization & Optimization	Entropy based feature selection, machine learning, and soft computing	Demand side management
Marvuglia et al. [160]	CRP Henri Tudor/CRTE, Luxembourg (with external collaboration)	2012	Detection	Generalized mapping regressor (GMR)	Detecting faults in wind farms
Fan et al. [161]	Monash University, Australia (with external collaboration)	2009	Classification & Optimization	Bayesian clustering	Scheduling wind farm and trading of wind power

Survey of 5G Network: Architecture and Emerging Technologies (Gupta and Jha, *IEEE Access*, 2015)



IEEE Access

SPECIAL SECTION ON RECENT ADVANCES IN SOFTWARE DEFINED NETWORKING FOR 5G NETWORKS

Received July 11, 2015, accepted July 22, 2015, date of publication July 28, 2015, date of current version August 7, 2015.

Digital Object Identifier 10.1109/ACCESS.2015.2461602

A Survey of 5G Network: Architecture and Emerging Technologies

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Corresponding author: A. Gupta (akhilgupta.112014@gmail.com)

ABSTRACT In the near future, i.e., beyond 4G, some of the prime objectives or demands that need to be addressed are increased capacity, improved data rate, decreased latency, and better quality of service. To meet these demands, drastic improvements need to be made in cellular network architecture. This paper presents the results of a detailed survey on the fifth generation (5G) cellular network architecture and some of the key emerging technologies that are helpful in improving the architecture and meeting the demands of users. In this detailed survey, the prime focus is on the 5G cellular network architecture, massive multiple input multiple output technology, and device-to-device communication (D2D). Along with this, some of the emerging technologies that are addressed in this paper include interference management, spectrum sharing with cognitive radio, ultra-dense networks, multi-radio access technology association, full duplex radios, millimeter wave solutions for 5G cellular networks, and cloud technologies for 5G radio access networks and software defined networks. In this paper, a general probable 5G cellular network architecture is proposed, which shows that D2D, small cell access points, network cloud, and the Internet of Things can be a part of 5G cellular network architecture. A detailed survey is included regarding current research projects being conducted in different countries by research groups and institutions that are working on 5G technologies.

INDEX TERMS 5G, cloud, D2D, massive MIMO, mm-wave, relay, small-cell.

I. INTRODUCTION

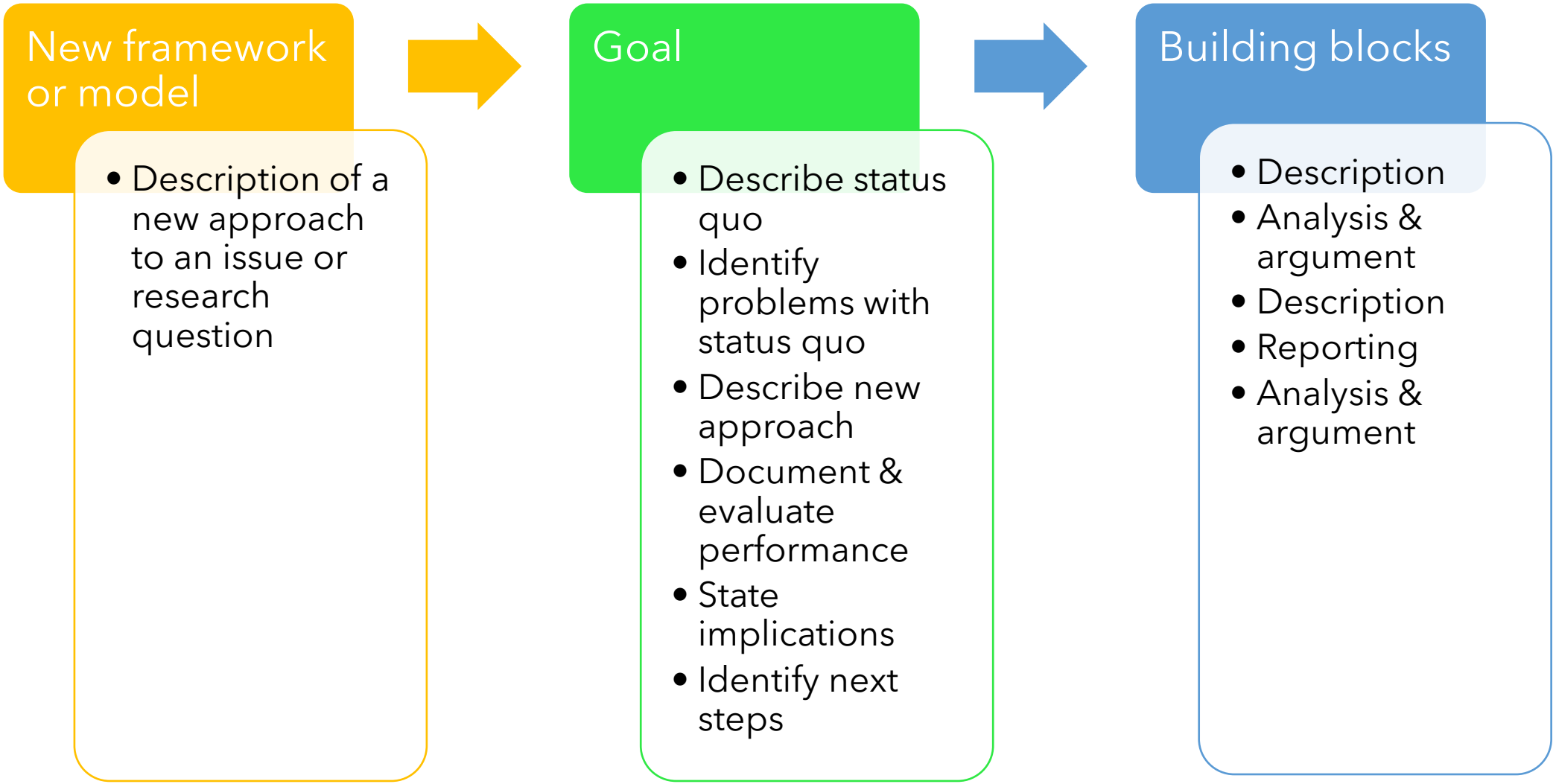
Today and in the recent future, to fulfill the presumptions and challenges of the near future, the wireless based networks of today will have to advance in various ways. Recent technology constituent like high-speed packet access (HSPA) and long-term evolution (LTE) will be launched as a segment of the advancement of current wireless based technologies. Nevertheless, auxiliary components may also constitute future new wireless based technologies, which may adjunct the evolved technologies. Specimen of these new technology components are different ways of accessing spectrum and considerably higher frequency ranges, the instigation of massive antenna configurations, direct device-to-device communication, and ultra-dense deployments [1].

Since its initiation in the late 1970s, mobile wireless communication has come across from analog voice calls to current modern technologies adept of providing high quality mobile broadband services with end-user data rates of several megabits per second over wide areas and tens, or even hundreds, of megabits per second locally. The extensive improvements in terms of potentiality of mobile communication networks, along with the initiation of new types of mobile devices such as smart phones and tablets, have produced an eruption of new applications which will be used in cases for mobile connectivity and a resultant exponential growth in network traffic. This paper presents our view on the future of wireless communication for 2020 and beyond. In this paper, we describe the key challenges that will be encountered by future wireless communication while enabling the networked society. Along with this, some technology routes that may be taken to fulfill these challenges [1].

The imagination of our future is a networked society with unbounded access to information and sharing of data which is accessible everywhere and every time for everyone and everything. To realize this imagination, new technology components need to be examined for the evolution of existing wireless based technologies. Present wireless based technologies, like the 3rd Generation Partnership Project (3GPP) LTE technology, HSPA and Wi-Fi, will be incorporating new technology components that will be helping to meet the needs of the future. Nevertheless, there may be certain scenarios that cannot be adequately addressed along with the evolution of ongoing existing technologies. The instigation of completely new wireless based technologies will complement the current technologies which are needed for the long term realization of the networked society [2].

- Limitations of 4G architecture
- Description of 5G and emerging technologies that are shaping it (massive MIMO technology, network function virtualization, device-to-device communication, interference management, spectrum sharing with cognitive radio, ultra-dense networks, multi-radio access technology association, full-duplex radios, millimeter wave solutions, and cloud technologies)
- Summary of research projects on 5G being carried out around the world
- Conclusion: article has provided a “platform” to “motivate” and guide future research

Structure for a **paper introducing a new framework or model**



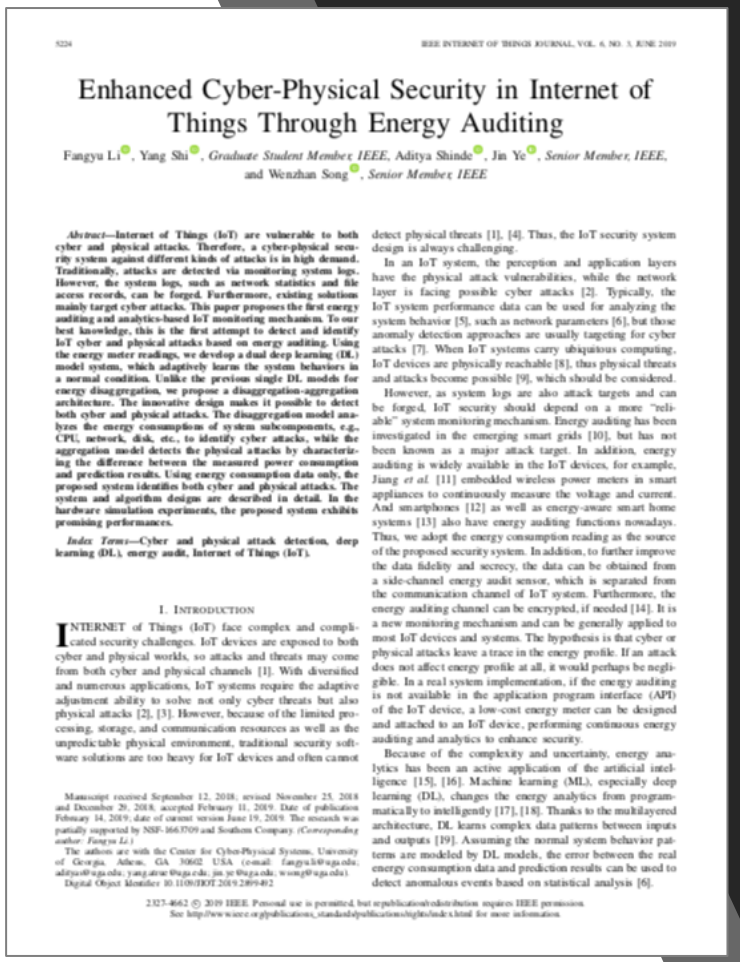
Compare the structure of a Master's thesis

Title: *Character Recognition Using Fourier Descriptors*

1. Introduction
2. Background (related work and key concepts)
3. Project (requirements and specifications)
4. Experiment and results
5. Conclusion (including future work)
6. References

Source: Jared Hopkins's Master's Thesis, Boise State U, 2006

Enhanced Cyber-Physical Security in Internet of Things Through Energy Auditing (Li et al., *IEEE Internet of Things Journal*, 2019)



5224 IEEE INTERNET OF THINGS JOURNAL, VOL. 6, NO. 3, JUNE 2019

Enhanced Cyber-Physical Security in Internet of Things Through Energy Auditing

Fangyu Li, Yang Shi, *Graduate Student Member IEEE*, Aditya Shinde, Jin Ye, *Senior Member, IEEE*, and Wenzhan Song, *Senior Member IEEE*

***Abstract*—Internet of Things (IoT) are vulnerable to both cyber and physical attacks. Therefore, a cyber-physical security system against different kinds of attacks is in high demand. Traditionally, attacks are detected via monitoring system logs. However, the system logs, such as network statistics and file access records, can be forged. Furthermore, existing solutions mainly target cyber attacks. This paper proposes the first energy auditing and analytics-based IoT monitoring mechanism. To our best knowledge, this is the first attempt to detect and identify IoT cyber and physical attacks based on energy auditing. Using the energy meter readings, we develop a dual deep learning (DL) model system, which adaptively learns the system behaviors in a normal condition. Unlike the previous single DL models for energy disaggregation, we propose a disaggregation-aggregation architecture. The innovative design makes it possible to detect both cyber and physical attacks. The disaggregation model analyzes the energy consumptions of system subcomponents, e.g., CPU, network, disk, etc., to identify cyber attacks, while the aggregation model detects the physical attacks by characterizing the difference between the measured power consumption and prediction results. Using energy consumption data only, the proposed system identifies both cyber and physical attacks. The system and algorithm designs are described in detail. In the hardware simulation experiments, the proposed system exhibits promising performances.**

***Index Terms*—Cyber and physical attack detection, deep learning (DL), energy audit, Internet of Things (IoT).**

I. Introduction

INTERNET of Things (IoT) face complex and complicated security challenges. IoT devices are exposed to both cyber and physical worlds, so attacks and threats may come from both cyber and physical channels [1]. With diversified and numerous applications, IoT systems require the adaptive adjustment ability to solve not only cyber threats but also physical attacks [2], [3]. However, because of the limited processing, storage, and communication resources as well as the unpredictable physical environment, traditional security software solutions are too heavy for IoT devices and often cannot detect physical threats [1], [4]. Thus, the IoT security system design is always challenging.

In an IoT system, the perception and application layers have the physical attack vulnerabilities, while the network layer is facing possible cyber attacks [2]. Typically, the IoT system performance data can be used for analyzing the system behavior [5], such as network parameters [6], but those anomaly detection approaches are usually targeting for cyber attacks [7]. When IoT systems carry ubiquitous computing, IoT devices are physically reachable [8], thus physical threats and attacks become possible [9], which should be considered.

However, as system logs are also attack targets and can be forged, IoT security should depend on a more "reliable" system monitoring mechanism. Energy auditing has been investigated in the emerging smart grids [10], but has not been known as a major attack target. In addition, energy auditing is widely available in the IoT devices, for example, Jiang *et al.* [11] embedded wireless power meters in smart appliances to continuously measure the voltage and current. And smartphones [12] as well as energy-aware smart home systems [13] also have energy auditing functions nowadays. Thus, we adopt the energy consumption reading as the source of the proposed security system. In addition, to further improve the data fidelity and secrecy, the data can be obtained from a side-channel energy audit sensor, which is separated from the communication channel of IoT system. Furthermore, the energy auditing channel can be encrypted, if needed [14]. It is a new monitoring mechanism and can be generally applied to most IoT devices and systems. The hypothesis is that cyber or physical attacks leave a trace in the energy profile. If an attack does not affect energy profile at all, it would perhaps be negligible. In a real system implementation, if the energy auditing is not available in the application program interface (API) of the IoT device, a low-cost energy meter can be designed and attached to an IoT device, performing continuous energy auditing and analytics to enhance security.

Because of the complexity and uncertainty, energy analytics has been an active application of the artificial intelligence [15], [16]. Machine learning (ML), especially deep learning (DL), changes the energy analytics from programmatically to intelligently [17], [18]. Thanks to the multilayered architecture, DL learns complex data patterns between inputs and outputs [19]. Assuming the normal system behavior patterns are modeled by DL models, the error between the real energy consumption data and prediction results can be used to detect anomalous events based on statistical analysis [6].

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The authors are with the Center for Cyber-Physical Systems, University of Georgia, Athens, GA 30602 USA (e-mail: fangyu.li@uga.edu; aditya@uga.edu; yang.shi.uc@uga.edu; jin.ye@uga.edu; wsong@uga.edu).

Digital Object Identifier 10.1109/JIOT.2019.2899402

- IoT is vulnerable to both cyber and physical attacks
- Current approach to detecting threats is to monitor system logs
- System logs can be forged and don't necessarily protect against physical threats
- Alternative approach is auditing energy meter readings and feeding them into a dual deep learning system based on a dual disaggregation-aggregation model
- Description of proposed system and results achieved during simulation experiments
- Conclusion: New approach will better secure IoT

A Case Study of the Augmentation and Evaluation of Training Data for Deep Learning

(Ding et al., *ACM Journal of Data and Information Quality,* 2019)

A Case Study of the Augmentation and Evaluation of Training Data for Deep Learning

JUNHUA DING, University of North Texas, USA
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Deep learning has been widely used for extracting values from big data. As many other machine learning algorithms, deep learning requires significant training data. Experiments have shown both the volume and the quality of training data can significantly impact the effectiveness of the value extraction. In some cases, the volume of training data is not sufficiently large for effectively training a deep learning model. In other cases, the quality of training data is not high enough to achieve the optimal performance. Many approaches have been proposed for augmenting training data to mitigate the deficiency. However, whether the augmented data are "fit for purpose" of deep learning is still a question. A framework for comprehensively evaluating the effectiveness of the augmented data for deep learning is still not available. In this article, we first discuss a data augmentation approach for deep learning. The approach includes two components: the first one is to remove noisy data in a dataset using a machine learning based classification to improve its quality, and the second one is to increase the volume of the dataset for effectively training a deep learning model. To evaluate the quality of the augmented data in fidelity, variety, and veracity, a data quality evaluation framework is proposed. We demonstrated the effectiveness of the data augmentation approach and the data quality evaluation framework through studying an automated classification of biology cell images using deep learning. The experimental results clearly demonstrated the impact of the volume and quality of training data to the performance of deep learning and the importance of the data quality evaluation. The data augmentation approach and the data quality evaluation framework can be straightforwardly adapted for deep learning study in other domains.

CCS Concepts: • **Computing methodologies** → **Machine learning**; **Cross-validation**;

Additional Key Words and Phrases: Data quality, machine learning, support vector machine, convolutional neural network, deep learning, diffraction image

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Authors' addresses: J. Ding, University of North Texas, Denton, TX, 76203; email: junhua.ding@unt.edu; X. Li and X. Kang, China University of Geosciences (Wuhan), Wuhan, China; emails: lihanyu2006@foxmail.com, 7452822@qq.com; V. N. Gudivada, East Carolina University, Greenville, NC; email: gudivadav15@ecu.edu.

1936-1955/2019/08-ART20 $15.00
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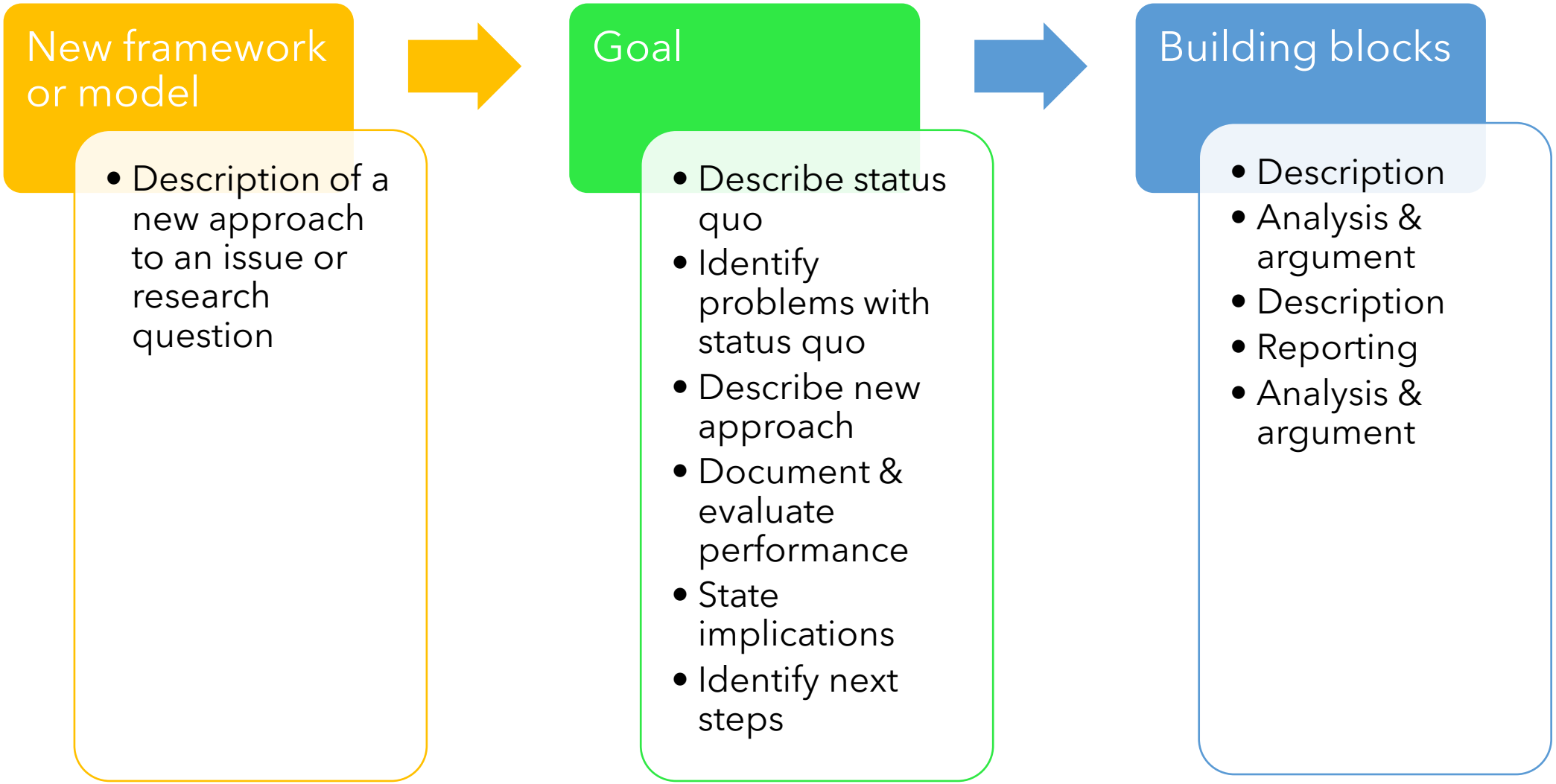
- Deep learning requires a large amount of training data, and that data must be of high quality.
- Since we haven't yet figured out how to meet both these conditions, various approaches have been proposed for augmenting the training data.
- Those approaches are missing a way to evaluate the quality of the augmented data.
- This article describes a new approach that improves the quality and quantity of augmented data.
- The approach has been tested on an automated classification of biology cell images and holds promise for deep learning in other domains.

Which building block do you find most challenging?

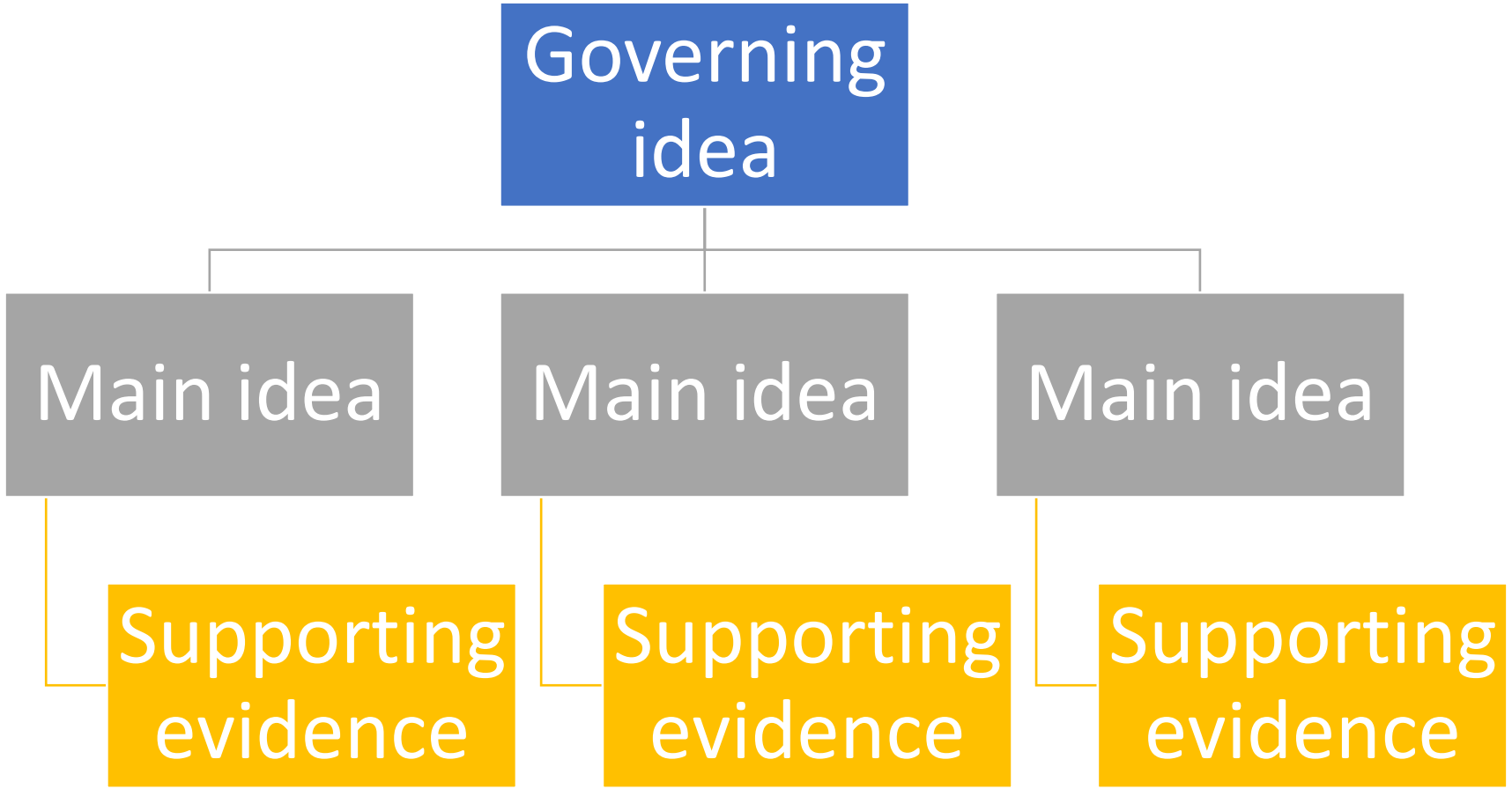


Stretch break

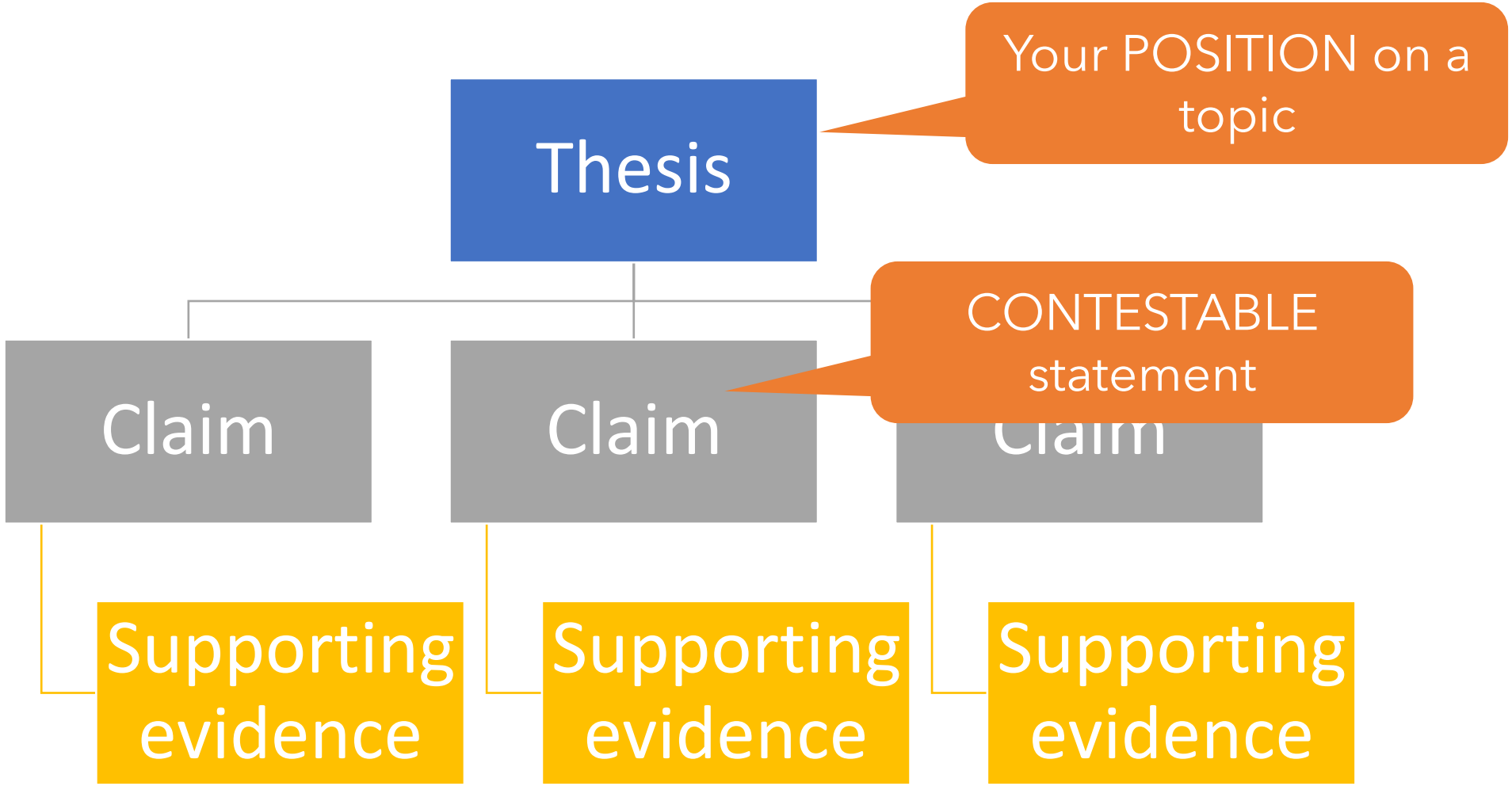
3. Create a logical document structure

We tend to generate writing in a linear way

But logically structured writing functions as a **hierarchy** of ideas and data



A logically structured argument stems from a **sound thesis**



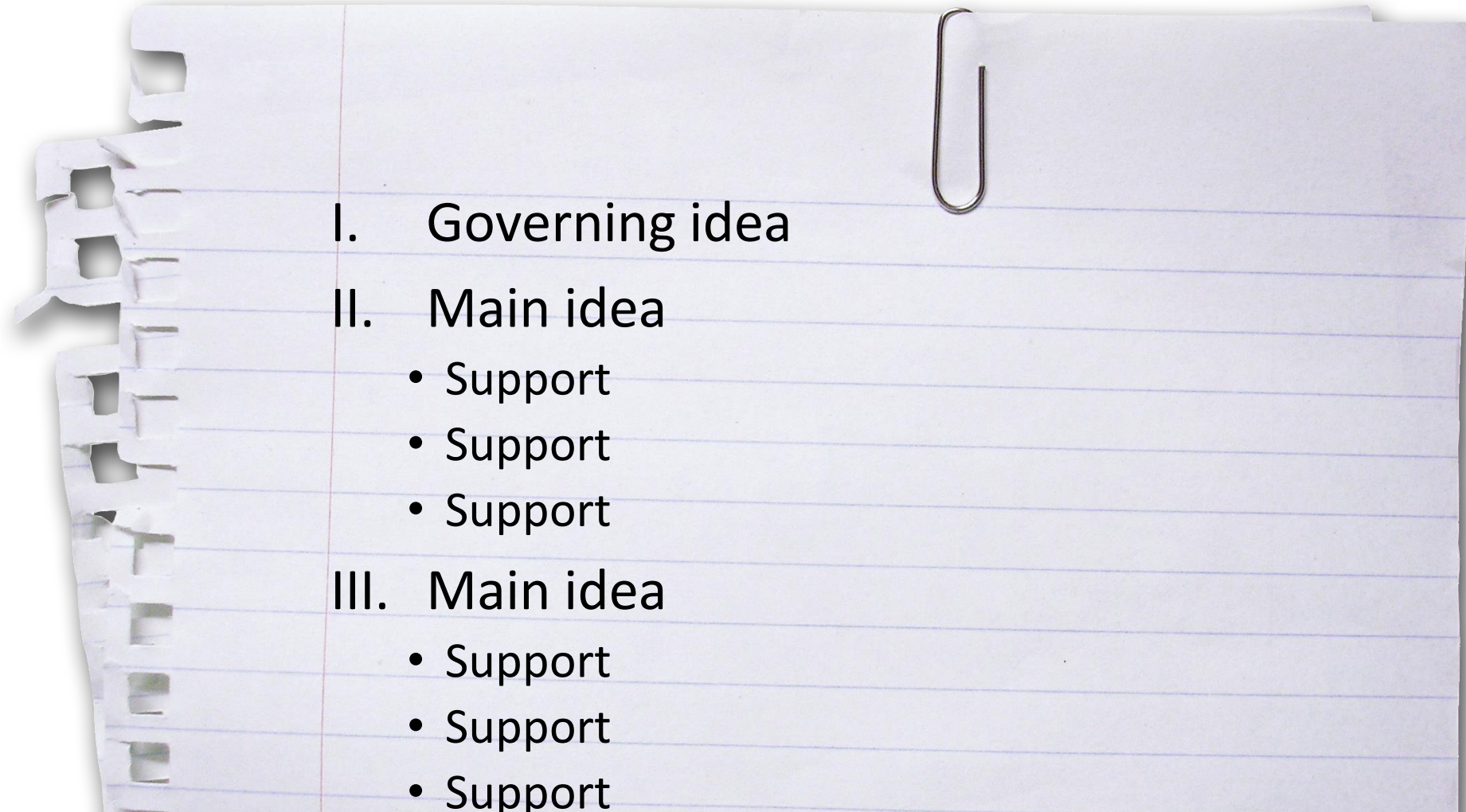
Can you tell the difference between a descriptive statement and a **position statement?**

1. Cyber security is the practice of using both hardware and software to protect a computing system or network from external threats.
2. No company today can hope to compete without harnessing the power of Big Data.
3. An AI-enabled application will overcome the shortcomings of the current system.
4. This paper will describe an algorithm to generate dynamic pricing for e-commerce.

Which of the following are **claims**?

1. This methodology has been widely considered the standard in the field for some time.
2. Robert Khan first reported on this phenomenon in 2011.
3. Today's Smart Grid technology does not adequately prepare us for a nationwide blackout, which is bound to occur sometime in the next five years.
4. The application collected and analyzed more than 20,000 data points in 18.3 minutes.

Reverse outlining shows the macro structure of a piece of writing



4. Construct cohesive paragraphs

Recognize the shape of paragraph you’re creating

Description communicates your observations

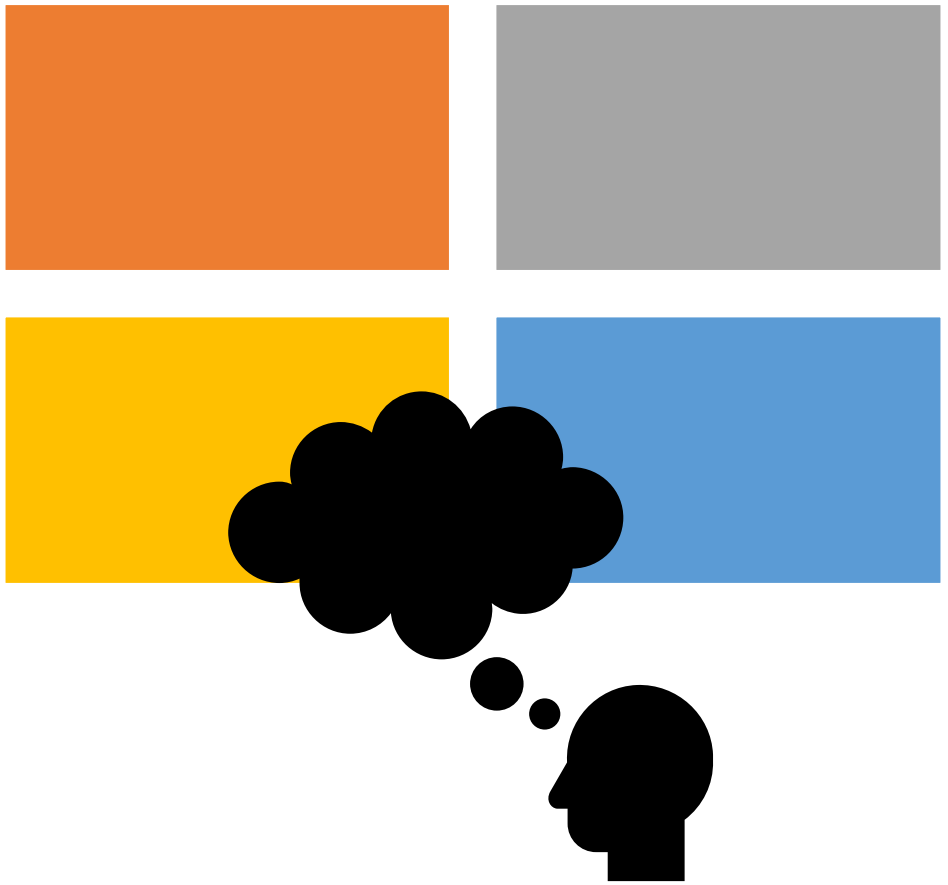
Description

- Lists various aspects of a thing.
- Can apply to a situation, process, framework, problem, etc.
- Organized from general to specific
- May also be organized by function, component, stage of a process, geography, etc.

Description-to-analysis makes sense of what you've observed

Listing of various aspects of the thing being described (e.g., situation, process, framework, problem)

Systematic examination with an aim to draw a conclusion about the meaning of what has been described



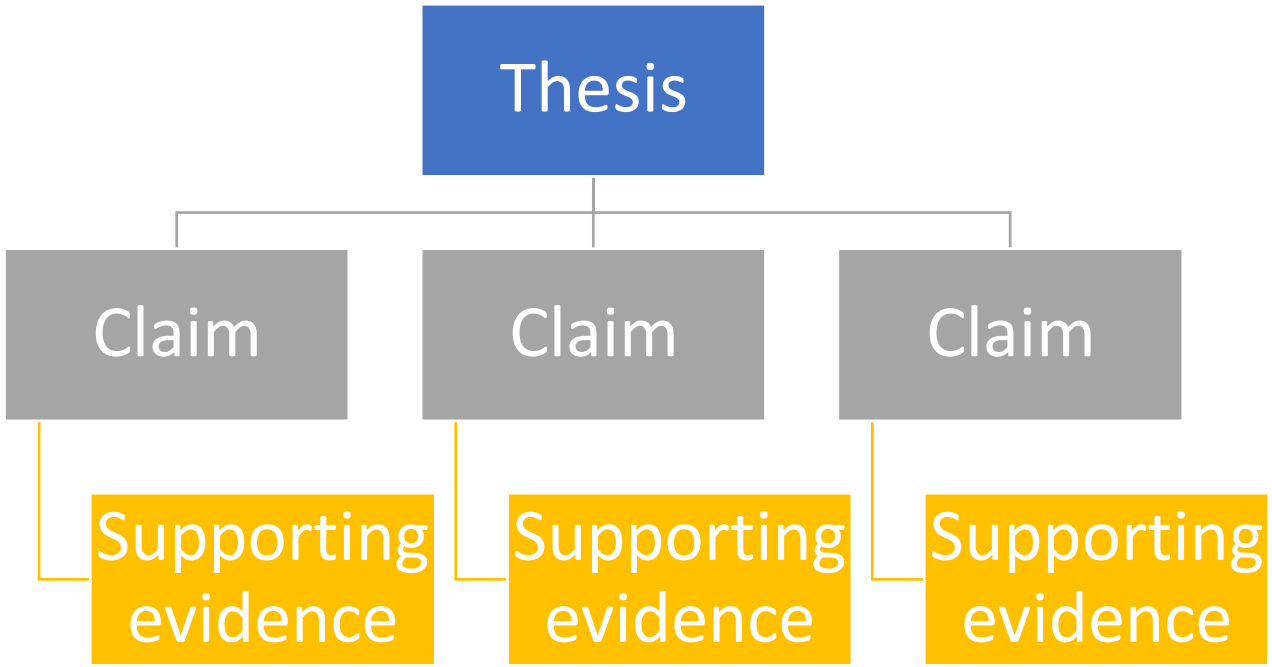
Argument creates a logical path to some kind of truth

Argument

- States a clear position on a topic (thesis)
- Claims + evidence

Evidence may include:

- Description
- Reporting
- Citation



Five key questions for paragraphing

1. What's your MAIN POINT?

2. What SUPPORTING POINTS (ideas and data) do you need to develop your main point?

3. How does each of those sub-points RELATE **to** the main point?

4. What's the best ORDER for presenting your main point and sub-point?

5. What CONNECTING WORDS AND PHRASES will you use to link your points together?

Three things that can go wrong with paragraphing

1. No clear main idea

Most adults know that too much emotion can wreak havoc on reasoning. Less known is the recent evidence that *too little* emotion can also wreak havoc on reasoning. Years of studies on patients with frontal-lobe disorders indicate that impaired ability to feel yields impaired ability to make decisions. Research has also shown that emotions can interfere with activity in the frontal lobes.

Source: Adapted from R.W. Picard. "Affective Computing," *M.I.T. Media Laboratory Perceptual Computing Section Technical Report No. 321*, (n.d.), https://affect.media.mit.edu/pdfs/95.picard.pdf

Most adults know that too much emotion can wreak havoc on reasoning. Less known is the recent evidence that *too little* emotion can also wreak havoc on reasoning. Years of studies on patients with frontal-lobe disorders indicate that impaired ability to feel yields impaired ability to make decisions; in other words, there is no 'pure reason.' Emotions are vital for us to function as rational decision-making humans.

Source: R.W. Picard. "Affective Computing." (original article)

2. More than one main idea

Although debate persists about the nature of the coupling between emotion and physiological response, most writers accept a physiological component in their definitions of emotion. Lazarus et al. [15] argue that each emotion probably has its own unique somatic response pattern, and cite other theorists who argue that each has its own set of unique facial muscle movement patterns. Clynes exploits the physiological component of emotion supremely in the provocative book, Sentics. He formulates seven principles for sentic (emotional) communication, which pertain to “sentic states,” a description given by Clynes to emotional states, largely to avoid the negative connotations as- sociated with “emotional.” Clynes emphasizes that emotions modulate our physical communication; the motor system acts as a carrier for communicating our sentic state.

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Source: R.W. Picard. “Affective Computing.”

3. Disconnected ideas

Emotions have a stigma in science; they are believed to be inherently non-scientific. Scientific principles are derived from rational thought, logical arguments, testable hypotheses, and repeatable experiments. There is room alongside science for “non-interfering” emotions such as those involved in curiosity, frustration, and the pleasure of discovery. Much scientific research has been prompted by fear. The role of emotions is marginalized at best.

Source: Adapted from R.W. Picard. “Affective Computing”

Emotions have a stigma in science; they are believed to be inherently non-scientific. Scientific principles are derived from rational thought, logical arguments, testable hypotheses, and repeatable experiments. However, there is room alongside science for “non-interfering” emotions such as those involved in curiosity, frustration, and the pleasure of discovery. In fact, much scientific research has been prompted by fear. Nonetheless, the role of emotions is marginalized at best.

Source: R.W. Picard. “Affective Computing” (original article)

What are your takeaways from today's session?

One thing you learned.

One question you are going to explore further.

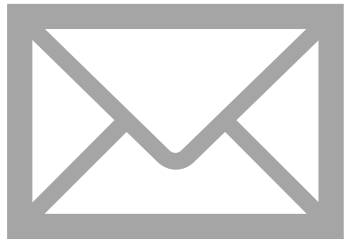
Tool to help you become your own writing coach

Scorecard for Assessing Research Papers

	4	3	2	1
Positioning	The writing positions the research relative to the status quo, including existing theories and studies. It clearly shows the knowledge gap the research addresses.	The writing accurately summarizes the status quo but does not explicitly connect the research with a specific knowledge gap.	The writing provides some general context for the research, but some aspects of the context may be missing or stated inaccurately.	The goal of the research is stated, but it's not connected with existing research and knowledge gaps.
Logical structure	- The writing centres on a single governing idea, and - Each main idea directly connects to and develops the governing idea, and - Sections and paragraphs are organized into cohesive units.	- The writing expresses a clear governing idea, and - Each main idea directly connects to and develops the governing idea, and - Sections and paragraphs may occasionally lack cohesion.	- The writing expresses a central idea, but it lacks clarity, and/or - Main ideas do not connect directly to the central idea (some ideas may be relevant but tangential), and/or - Sections and paragraphs tend to be loosely organized.	The writing lacks a clear central idea and is loosely focused throughout. The writing rambles without a clear sense of direction.
Comprehensiveness	The methodology, results, and discussion sections include everything a reader would need to know in order to replicate the study.	The methodology, results, and discussion sections provide an accurate picture of what happened in the study.	The methodology, results, and discussion sections are mainly accurate, but some minor points may be missing or misrepresented.	The methodology, results, and discussion sections are missing key points.

Stay in touch!

Let’s connect on LinkedIn



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