IEEE 2025-26 PROJECT LIST	
Cloud Computing	
CODE	TITLE AND ABSTRACT
26-ANSP-CC-001	**A Federated Cloud-Based Auction Mechanism for Real-Time Scheduling of Vehicle Sensors in Vehicle-Road-Cloud Collaborative System** Federated cloud, as a promising technology, can improve the computing capacity for autonomous driving in the vehicle-road-cloud collaborative system. However, the allocation of federated clouds should consider the environmental changes based on the real-time impact of vehicle terminal location. To improve computational efficiency while ensur- ing the effectiveness of federated clouds, this paper proposes a one-sided matching reverse auction based on the federated clouds (OSFC) method for scheduling autonomous driving sensors in a vehicle-road-cloud collaborative environment. This method dynamically allocates communication resources according to the actual situation of the vehicle terminals in real time. Numerical simulations show that our proposed OSFC method significantly improves computational efficiency while ensuring the effectiveness of federated clouds compared with state-of-the-art work.
26-ANSP-CC-002	**A Green Cloud-Based Framework for Energy-Efficient Task Scheduling Using Carbon Intensity Data for Heterogeneous Cloud Servers** Managing modern data centre operations is increasingly complex due to rising workloads and numerous interdependent components. Organizations that still rely on outdated, manual data management methods face a heightened risk of human error and struggle to adapt quickly to shifting demands. This inefficiency leads to excessive energy consumption and higher CO2 emissions in cloud data centres. To address these challenges, integrating advanced automation within Infrastructure as a Service (IaaS) has become essential for IT industries, representing a significant step in the ongoing transformation of cloud computing. For data centres aiming to enhance efficiency and reduce their carbon footprint, intelligent automation provides tangible benefits, including optimized resource allocation, dynamic workload balancing, and lower operational costs. As computing resources remain energy-intensive, the growing demand for AI and ML workloads is expected to surge by 160% by 2030 (Goldman Sachs). This heightened focus on energy efficiency has driven the need for advanced scheduling systems that reduce carbon emissions and operational expenses. This study introduces a deployable cloud-based framework that incorporates real-time carbon intensity data into energy-intensive task scheduling. By utilizing AWS services, the proposed algorithm dynamically adjusts high-energy workloads based on regional carbon intensity fluctuations, using both historical and real-time analytics. This approach enables cloud service providers and enterprises to minimize environmental impact without sacrificing performance. Designed for seamless integration with existing cloud infrastructures—including AWS, Google Cloud, and Azure— this scalable solution utilizes Kubernetes-based scheduling and containerized workloads for intelligent resource management. By combining automation, real-time analytics, and cloud-native technologies, the framework significantly enhances energy efficiency compared to traditional scheduling methods. Moreover, the proposed system aligns with key United Nations Sustainable Development Goals (SDGs), including climate action (SDG 13),

	clean energy (SDG 7), sustainable urban development (SDG 11), and infrastructure innovation (SDG 9). By promoting energy-efficient cloud computing, this research supports a more sustainable, cost-effective digital ecosystem that meets the growing demands of high-performance computing and AI-driven workloads.
26-ANSP-CC-003	**A Systematic Literature Review on Risk Assessment in Cloud Computing: Recent Research Advancements** The era of Industry 4.0 is characterized by a significant shift in information and communication technology, which has facilitated the emergence of new technology-driven investments. Key components such as Cloud Computing, Artificial Intelligence (AI), Big Data, and the Internet of Things (IoT) form the foundation of this industrial revolution. Cloud Computing serves as a service offering organizations a range of opportunities such as flexibility, scalability, and cost-effectiveness. However, it is essential for organizations to guarantee the security of their resources, especially applications, data, and cloud-based networks to use all cloud offered services effectively for both individuals and organizations. Risk assessment (RA) is essential for identifying, analyzing, and evaluating potential risks that could negatively impact cloud resources, yet developing a tailored approach continues to be challenging, because of the complex nature of cloud. The objective of this systematic literature review is to thoroughly examine the latest advancements in cloud computing security, with a primary focus on RA. Our study explores also various cloud RA scenarios where Machine Learning (ML) and Deep Learning (DL) techniques are applied to identify and mitigate potential risks in cloud environments. This study highlights the latest proposed solutions for assessing risks on cloud, thereby contributing to the development of a comprehensive RA while addressing the specific characteristics of the cloud and its complex nature. Additionally, it addresses process for future research work to enhance RA according many criteria.
26-ANSP-CC-004	**An Adaptive Thin Cloud Removal Method for Mitigating Bright Surface Interference** A thin cloud thickness map (TCTM) is crucial for thin cloud removal tasks, but accurately estimating the TCTM can be a significant challenge. The TCTM is highly susceptible to buildings, which are unavoidable. However, bright surface extraction in existing methods is susceptible to thin clouds, affecting the estimation results for the TCTM. In this article, we propose an adaptive thin cloud removal method for mitigating bright surface interference. Initially, the TCTM is estimated based on the dark pixel search method. The latent low-rank representation method is then em- ployed to decompose the TCTM, resulting in a low-rank optimized TCTM. We also propose a new short-wave infrared-based building index, which effectively extracts building regions in images that are affected by thin clouds, while remaining largely unaffected by them. Based on this index, an adaptive building suppression weight matrix is constructed to reduce the TCTM for building regions covered by thin clouds. For buildings without cloud cover, the inverse proportional averaging method is used to obtain a fixed weight to suppress the TCTM. Finally, the aerosol thickness in the TCTM is excluded, and the thin cloud reflectivity components for each band are resolved through linear relationships combined with scatter- ing laws, achieving thin cloud removal in single remote sensing images. The experimental results demonstrate that the proposed method can accurately extract the TCTM in various scenarios. The thin cloud removal results exhibit high color and structural consistency with the reference images and achieve optimal spectral fidelity.

26-ANSP-CC-005	**Cloud and Cloud Shadow Detection for Multi-Modal Imagery With Gap-Filling Applications** Cloud and cloud shadow (CCS) detection algorithms play a crucial role in the preprocessing of remote sensing data and directly affect the accuracy of subsequent analyses, making them an essential step in most analytical processes. Recent techniques for detecting CCS often employ deep learning methods, which are effective but typically require extensive training data specific to each type of satellite imagery. This study presents a new methodology that applies a model trained on the preconstructed KOMPSAT-3/3A CCS dataset to Landsat-8 and Sentinel-2 satellite imagery. The experimental results demonstrated that the CCS detection model based on KOMPSAT-3/3A achieved a mean F1 score of 0.846 on the test dataset. When applied to Landsat-8 SPARCS and Sentinel-2 CloudSEN12 test datasets, it also showed high performance, with mean F1 scores of 0.741 and 0.8, respectively, effectively indicating that multi-modal CCS detection can be successfully implemented. Applying this model to different sensor imagery confirmed its effectiveness in gap filling, which can be utilized to enhance time-series analyses where continuous monitoring is required. In conclusion, this approach not only proves beneficial for time-series analysis but also significantly reduces the time and effort required to build datasets in deep learning-based CCS detection.
26-ANSP-CC-006	**Cloud Telescope: An Ephemeral, Distributed, and Cloud-Native Architecture for Collecting Internet Background Radiation** For two decades, cyber security researchers have been looking to answer one major question: what threats affect the Internet at large? In addition, what malicious traffic patterns would emerge if we could sample the unsolicited traffic - termed Internet Background Radiation (IBR) - arriving at devices directly connected to the Internet? The standard approach to collecting malicious traffic is the Network Telescope: a computer device assigned with a public IP address range, configured to passively listen to incoming packets. The deployment of Network Telescopes has helped to detect and quantify major cyberspace outbreaks, from the rise of the Conficker malware, to uncovering massive botnet propagation activity, such as performed by Mirai and its variants, against the Internet-of-Things. This paper introduces the Cloud Telescope: an ephemeral, cloud-native architecture, described as Infrastructure-as-Code, enabling for geographically distributed capture of the IBR, along with a discussion of a 5-month-long validation experiment, in which a sensor fleet comprising 130 cloud instances was launched across twenty-six regions of the world. The result is a quantitative and qualitative analysis of 530 million captured packets. This includes traffic breakdown by protocol: TCP (80%), UDP (3%), ICMP (17%), and by source country. We also discuss traffic aggregation by destination country and by affected cloud region, enabling novel forms of geopolitical influence analysis.
26-ANSP-CC-007	**DAPSS: A Novel Network for DOM Assisted Oblique Photography Point Cloud Semantic Segmentation** While most existing advanced large-scale point cloud semantic segmentation methods can accurately identify most large- scale objects, there is still room for improvement in the recognition accuracy of small-scale, low-proportion objects. Compared to point clouds, digital orthophoto maps (DOMs) has a more structured data format, allowing for better recognition of small-scale surface features. However, in existing projection-based methods, directly mapping images onto point clouds leads to occlusion issues. If image and point cloud features are simply concatenated, it results in feature blurring. Based on this observation, this article proposes a DAPSS network for point cloud semantic

	segmentation, assisted by prior knowledge constructed from DOM. The pretrained DOM features can provide a broader receptive field as guidance for learning the local context features of point clouds. Vertical occlu- sion has an issue, making ray-based mapping methods unsuitable. We propose a method that search for the nearest mapped point cloud in spherical space to fill in the occluded point cloud based on the already mapped point cloud. The traditional approach of directly concatenating point cloud features with image features often leads to feature blurring. Therefore, we propose a plug- and-play multimodal feature adaptive fusion module, which can adaptively select and aggregate features from different modalities to reduce redundant information further. In addition, we designed a cascaded multimodal feature deep fusion module to promote deep fusion between different modal features. Experiments on two large datasets demonstrate that DAPSS outperforms current main- stream methods, achieving mean Intersection-over-Union scores of 65.9% and 82.9% on the SansetUrban and SUM-Helsinki datasets, respectively. DAPSS not only effectively addresses the recognition of small-scale surface features, but also resolves the occlusion problems associated with projection-based methods.
26-ANSP-CC-008	**Design of Cloud-Based Complex VR 3D Scene Interaction Based on Attribute Preferences** This paper presents a novel approach to enhancing real-time 3D design collaboration in cloud-rendered virtual reality (VR) environments through adaptive interface personalization and efficient resource management. The study leverages Reinforcement Learning (RL) and Particle Swarm Optimization (PSO) to address critical challenges such as user interface adaptability and cloud resource allocation. Our methodology incorporates an RL framework for dynamic interface personalization, which adjusts in real-time based on user interactions and feedback. The RL agent continuously learns from user behavior to optimize the interface, leading to improved navigation, reduced latency, and higher user satisfaction. Concurrently, PSO is employed to optimize cloud resource allocation, managing CPU, GPU, and bandwidth to minimize latency and enhance performance efficiency. Key findings indicate that the RL-based adaptive interface significantly improved user interaction, with reductions in latency up to 30% and increased task completion rates by 50%. PSO optimization led to a 17% to 23% improvement in resource utilization, ensuring a responsive and efficient VR environment even under high load conditions. The implications of these findings are substantial for real-time 3D design collaboration. By integrating RL for personalization and PSO for resource management, our approach facilitates a more intuitive and seamless collaborative experience, enhancing productivity and satisfaction. This research sets a precedent for future advancements in VR environments, emphasizing the value of combining advanced algorithms to address complex challenges in immersive technology.
26-ANSP-CC-009	**Differentiating Thick Clouds From Thin Clouds by Using Intensity Inhomogeneity** Clouds are usually present in optical satellite images, yet they occlude the ground truth, making it difficult to interpret satellite images. Moreover, distinguishing between areas with thick clouds and thin clouds is challenging when using the existing approaches. Therefore, in this article, an approach based on intensity inhomogeneity is proposed to differentiate thick clouds from thin clouds and vice versa. Intensity inhomogeneity indicates that the pixels in satellite images contain ground-truth information and other information, such as disturbances like clouds. In the proposed approach, intensity inhomogeneity is used to identify thin and thick clouds by assuming that intensity inhomogeneity is distributed as a Gaussian function in an image patch. Accordingly, the central pixels make more significant contributions than the other pixels. Intensity inhomogeneity can be approximated by incorporating it into an image segmentation model. Image segmentation models are numerically implemented in this article by using

	level-set functions in an iterative scheme. When convergence is reached, the given image is segmented, and simultaneously, thick cloud regions are distinguished from thin clouds based on the approximated intensity inhomogeneity values. Areas with approximated intensity inho- mogeneity values smaller than one represent thin clouds. In this article, Sentinel-2 optical satellite images were used to evaluate the performance of the proposed approach. The processed results demonstrated that the proposed approach can be used to differentiate areas with thick clouds from those with thin clouds and vice versa. Based on this differentiation, various strategies can be applied to restore the ground truth of images covered with clouds.
26-ANSP-CC-010	**DTNLS: 3D Point Cloud Segmentation Based on 2D Image and 3D Point Cloud Double Texture Feature** Panoramic segmentation of 3D point clouds is an essential and challenging technology for robots with 3D detection and measurement capabilities. In order to fuse the color information of 2D image pixels with the spatial position information of the 3D LiDAR point cloud, it is necessary to establish the corresponding relationship between the RGB of pixels and the XYZ position of the 3D LiDAR point cloud. We present Double Texture Neighbor LiDAR Segmentation (DTNLS) in this letter. Double texture refers to the color texture of the image and the point cloud texture of the 3D LiDAR. The DTNLS method first uses the color texture feature of the image to segment the pixels and then obtains the clustering center and segmentation boundary outline. 3D LiDAR point cloud texture segmentation takes the clustering center obtained above as the diffusion source, diffuses outwards along the ring LiDAR line, finds the LiDAR point cloud texture boundary features near the image segmentation boundary contour, and finally realizes 3D point cloud segmentation. We carried out quantitative analysis experiments, and the results showed that compared with the best results among the existing mainstream segmentation methods, the proposed DTNLS method improved the accuracy of pedestrian segmentation by 32.2%. The recall improved by 20.12% in pedestrian segmentation. *IoU* improved by 48.8% for pedestrians. We conducted empirical studies on public datasets and our datasets to demonstrate that DTNLS has broad applicability and better performance in 3D point cloud segmentation than the previous latest techniques, without the need for any 2D images and 3D point cloud training data.
26-ANSP-CC-011	**Enhancing Cloud Detection in Polar Regions Using Combined Spectral and Textural Features for Landsat 8/9 OLI Imagery** Remote sensing is a cost-effective and efficient method for studying polar regions. However, cloud cover in optical remote sensing images can diminish the data integrity for certain snow/ice applications. Existing cloud detection algorithms are primarily designed for mid and low latitude images, which poses significant challenges in polar regions due to the similar spectral charac- teristics of clouds and snow/ice surface. This study proposes a new cloud detection algorithm for Landsat 8/9 OLI/TIRS images, which combines spectral and texture features to more accurately differentiate clouds from snow. Initially, the algorithm employs function of mask (Fmask) for preliminary cloud detection, followed by a block processing strategy that integrates the gray-level co- occurrence matrix to extract local texture features for secondary discrimination, helping to eliminate snow misidentified as clouds. In addition, the algorithm utilizes short-wave infrared (1.57–1.65 μm) and cirrus bands (1.36–1.38 μm) to extract cirrus clouds and employs morphological closing operations to fill gaps in the cloud mask. The algorithm maintains an average accuracy of approximately 97% for different types of clouds. Tested on the Landsat 8 cloud cover assessment validation data, a cloud mask dataset verified by experts, this algorithm achieves an average detection accuracy of 93%, signifying improvements of 37% and 45% over the automatic cloud cover

	assessment and Fmask algorithms, respectively. Texture-based methods effectively reduce snow-cloud misclassification but may inadvertently misclassify texturally similar features, highlighting the need for improved discrimination in classification algorithms. In summary, this novel method signifi- cantly enhances the efficiency and precision of cloud detection in polar optical remote sensing images. Consequently, it improves the accuracy of other quantitative remote sensing investigations, such as atmosphere correction, albedo estimation, and so on.
26-ANSP-CC-012	**Evaluation of GCOM-C/SGLI Cloud Flag Product With Spaceborne Cloud Radar and Lidar in Northern Hemisphere High Latitudes** The cloud flag (CLFG) product from the Second-Generation Global Imager (SGLI) onboard the Global Change Observation Mission-Climate (GCOM-C) provides cloud/clear discrimination. It is generally difficult to distinguish clouds over surfaces covered with snow/ice. CLFG was updated in 2021 (Ver. 3) through the addition of a deep neural network (DNN) method to the previous Ver. 2 algorithm. We evaluated both versions against collocated CloudSat radar and Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Obser- vations (CALIPSO) lidar for October 2018-June 2019 at high latitudes in the Northern Hemisphere (over 600000 matchup pairs, around 65◦–75◦ North latitude). The results show that CLFG Ver. 3 achieved a cloud detection accuracy of 72.4%, a 2.0% improvement over Ver. 2. This improvement is attributed to the significant improvement of 8.1% for land/daytime scenes, where the DNN method successfully detects clouds over snow- or ice-covered surfaces, which are missed by the Ver. 2 algorithm. Limiting the samples to snow-/ice-covered surfaces yields an even greater improvement of 9.0% for land/day scenes and a net 3.1% increase across all scenes. Challenges remain in cloud detection at night when only thermal infrared (TIR) channels are available (3.9% and 8.2% decrease in overall accuracy compared to daytime for land and ocean, respectively). Cloud discrimination over Greenland is particularly challenging compared with other land regions because the radiative contrast between clouds and the high-albedo surface is low. This study also examined the uncertainty information embedded in CLFG, which enables user-tailored data extraction. We found that users can extract pixels with higher reliability in Ver. 3 by selecting only the most certain classes.

26-ANSP-CC-013	**Experiment of wireless transmission of cloud data in cloud avoidance network for optical communications between space and ground** Optical communication links between space and ground will be disconnected by cloud blockages only based on optical site diversity, because of cloud blockages randomly changing in time and space. To continue the operation, cloud avoidance network with cloud observation from space and ground and network controls are necessary, however, optical ground stations will be often placed at remote sites without ground wired network. To realize continuous operation under such an environment, our cloud avoidance network is designed to extract and handle only minimum and meaningful information of clouds. The network experiment has been conducted on ground wired network and the operation possibility has been also verified on ground wireless network. In this paper, first, overview of our cloud avoidance network and structures of each equipment on the network, Next, operation possibility of our cloud avoidance network, even based on a low rate communication environment because of the unique system feature of handling only information required for the cloud avoidance network and then,

	the operation possibility based on the mobile wireless router verified through our experiment are presented.
26-ANSP-CC-014	**FACNet: Feature alignment fast point cloud completion network** Point cloud completion aims to infer complete point clouds based on partial 3D point cloud inputs. Various previous methods apply coarse- to-fine strategy networks for generating complete point clouds. However, such methods are not only relatively time-consuming but also cannot provide representative complete shape features based on partial inputs. In this paper, a novel *feature alignment fast point cloud completion network* (FACNet) is proposed to directly and efficiently generate the detailed shapes of objects. FACNet aligns high-dimensional feature distributions of both partial and complete point clouds to maintain global information about the complete shape. During its decoding process, the local features from the partial point cloud are incorporated along with the maintained global information to ensure complete and time-saving generation of the complete point cloud. Experimental results show that FACNet outperforms the state-of-the- art on PCN, Completion3D, and MVP datasets, and achieves competitive performance on ShapeNet-55 and KITTI datasets. Moreover, FACNet and a simplified version, FACNet-slight, achieve a significant speedup of 3–10 times over other state-of-the-art methods.
26-ANSP-CC-015	**Formation Producing Control of Multi-Quadcopter Systems Under the Cloud Access** The use of cloud-connected UAV swarm plays an important role in the future of mobility. One of the challenges to address before realising this technology is achieving a formation producing control of quadcopter swarms under the cloud access. For this purpose, the problem of cloud-based formation control for a nonlinear 6-DOF under-actuated multi-quadcopter system is studied in this paper. This is different compared to the existing literature, studying the rendezvous problem for a second-order multi-agent system. As the first step, a hierarchical control structure is provided to derive the control laws and conditions for the stability of the nonlinear under-actuated multi-quadcopter system to guarantee the asymptotic consensus of the quads' positions to the biased average of the initial positions. Then, the control laws are extended and derived under the cloud access condition and the stability proofs are analysed for the quadcopters' dynamics. The results guarantee the practical consensus of the quadcopter system to the biased position of their initial values. Toward this, a scheduling rule for the access to the cloud is designed and it is shown that the rule avoids the Zeno behavior.For this purpose, upper bounds on the control laws of the cloud-connected neighboring agents between two consecutive connections of each agent are considered. The numerical results verify the efficacy of the proposed method.
26-ANSP-CC-016	**Improved Indoor 3D Point Cloud Semantic Segmentation Method Based on PointNet++** With the rapid advancement of point cloud-based applications, including autonomous driving and robotic navigation, 3D point cloud semantic segmentation has gained increasing research attention. PointNet++ is a widely recognized neural architecture for point cloud analysis. However, its inefficient local feature learning and limited global context capture reduce segmentation accuracy. To overcome these limitations, this paper presents an enhanced PointNet++-based model for indoor 3D point cloud segmentation. Specifically, FastKAN (Kolmogorov-Arnold Networks) replaces all MLP layers, utilizing an attention mechanism during feature aggregation to emphasize important features while preserving both local and global details, thereby enhancing segmentation performance. Additionally, the SA (Shuffle Attention) mechanism is integrated, employing channel grouping and rearrangement to effectively capture both local and

	global information while ensuring computational efficiency. Experimental results on the Stanford S3DIS dataset show that the proposed model achieves an overall accuracy of 86.5%, reflecting a 3.6% improvement over PointNet++, and a mean Intersection over Union (mIoU) of 57.3%, 3.8% higher than PointNet++.
26-ANSP-CC-017	**Literature Review of Machine Learning and Threat Intelligence in Cloud Security** **Cloud computing has transformed IT services by making them more scalable and cost-effective. However, this shift has also introduced new security challenges that traditional methods are finding hard to tackle. This review paper looks at how combining machine learning (ML) with threat intelligence can improve cloud security, an approach that hasn't been widely explored yet. By reviewing recent studies, we show that ML and threat intelligence does more than detect known threats. They can also adapt to new and evolving ones, making cloud systems more secure against cyberattacks. Our analysis highlights how this combined approach provides better protection and flexibility. We also identify some important gaps in the current research and suggest areas for future study to make these security systems even more effective. This review aims to provide useful insights for researchers, helping to build more proactive cloud security strategies.**
26-ANSP-CC-018	**Methods for Improving Point Cloud Authenticity in LiDAR Simulation for Autonomous Driving: A Review** Collecting LiDAR data for autonomous driving using real vehicles is costly, scenario-limited, and challenging to annotate. Simulated LiDAR point clouds offer flexible configurations, reduced costs, and readily available labels but often lack the realism of real-world data. This study provides a comprehensive review of methods to enhance the authenticity of simulated LiDAR data, focusing on simulation scenarios, environmental conditions, and point cloud features. Additionally, we discuss verification techniques, including direct and indirect methods, to assess authenticity improvements. Experimental results demonstrate the effectiveness of these techniques in enhancing perception algorithm performance. The paper identifies challenges in simulating LiDAR data, such as accuracy discrepancies, brand adaptability, and the need for comprehensive evaluation metrics. It also proposes future directions to bridge the gap between simulated and real-world data, aiming to optimize hybrid training models for improved autonomous driving applications.

26-ANSP-CC-019	**Performance Analysis of Deep Learning-Based Lossy Point Cloud Geometry Compression Coding Solutions** The quality evaluation of three deep learning-based coding solutions for point cloud geometry, notably ADLPCC, PCC GEO CNNv2, and PCGCv2, is presented. The MPEG G-PCC was used as an anchor. Furthermore, LUT SR, which uses multi-resolution Look-Up tables, was also considered. A set of six point clouds representing landscapes and objects was used. As point cloud texture has a great influence on the perceived quality, two different subjective studies that differ in the texture addition model are reported and statistically compared. In the first experiment, the dataset was first encoded with the identified codecs. Then, the texture of the original point cloud was mapped to the decoded point cloud using the *Meshlab* software, resulting in a point cloud with both geometry and texture information. Finally, the resulting point cloud was encoded with G-PCC using the lossless-geometry-lossy-atts mode, while in the second experiment the texture was mapped directly onto the distorted geometry. Moreover, both subjective evaluations were used to benchmark a set of objective point cloud quality metrics. The

	two experiments were shown to be statistically different, and the tested metrics revealed quite different behaviors for the two sets of data. The results reveal that the preferred method of evaluation is the encoding of texture information with G-PCC after mapping the texture of the original point cloud to the distorted point cloud. The results suggest that current objective metrics are not suitable to evaluate distortions created by machine learning- based codecs. Finally, this paper presents a study on the compression performance stability of the tested machine learning-based codecs using different training sessions. The obtained results show that the tested codecs revealed a high level of stability across all training sessions for most of the content, although some undesirable exceptions may be found.
26-ANSP-CC-020	**Point mask transformer for outdoor point cloud semantic segmentation** Current outdoor point-cloud segmentation methods typically formulate semantic segmentation as a per-point/voxel-classification task. Although this strategy is straightforward because it classifies each point directly, it ignores the overall relationship of the category. As an alternative paradigm, mask classification decouples category classification from region localization, allowing the model to better capture overall category relationships. In this paper, we propose a novel approach called the point mask transformer (PMFormer), which transforms the semantic segmentation of point clouds from per-point classification to mask classification using a transformer architecture. The proposed model comprises a 3D backbone, transformer decoder, and segmentation head that predicts a series of binary masks, each associated with a global class label. Furthermore, to accommodate the unique characteristics of large and sparse outdoor point-cloud scenes, we propose three enhancements for the integration of point-cloud data with the transformer: MaskMix, 3D position encoding, and attention weights. We evaluate our model using the SemanticKITTI and nuScenes datasets. Our experimental results show that the proposed method outperforms state-of-the-art semantic segmentation approaches.
26-ANSP-CC-021	**Research on Point Cloud Registration and Stitching Fusion Algorithm Based on GCN-PRFNet** Point-cloud registration and stitching are important topics in the field of robot navigation and 3D reconstruction, e.g., the accuracy of point cloud registration and stitching in robot navigation directly affects the accuracy of map construction. Many researchers have proposed various algorithms for deep learning-based point cloud registration and stitching methods with good performance, and although there are end-to-end methods that have made progress, they still have limitations in local feature fusion efficiency and geometric detail retention. To address this issue, a fusion algorithm for registration and stitching based on a GCN-PRFNet point cloud is proposed. The network has a feature extraction module, a point cloud registration module, and a point cloud splicing and fusion module. GCN-PRFNet can efficiently handle the task of point cloud registration and splicing and fusion in partially overlapping regions and is robust to noise. The model is trained on the ModelNet40 dataset, and its registration and splicing accuracies are improved by 53.9%, 20.1%, 8.3%, 12.2%, 6.1% and 1.8% when compared with the traditional iterative closest point and learning-based PointNetLK, DGCNN, RPM-Net, DCP, and PointViG methods. This indicates that the constructed model is effective in point cloud registration and splicing. Meanwhile, point-cloud registration and splicing tests were performed on five self-constructed artefact datasets, and their registration and splicing accuracies were over 90%, indicating that the constructed end-to-end point-cloud registration and splicing model is considerably effective in real-world application scenarios.

26-ANSP-CC-022	**SHERA: SHAP-Enhanced Resource Allocation for VM Scheduling and Efficient Cloud Computing** Cloud computing plays a crucial role in modern technology, providing scalable and on-demand computing resources. However, excessive resource use can result in higher energy demand, higher operating expenses, and a more significant adverse effect on the environment as per study by Berl et al. (2010). In order to forecast and maximize the energy efficiency in cloud systems, this paper presents a machine learning based methodology. Using the Cloud Efficiency Dataset from Google Cloud, key performance indicators such as CPU usage, memory consumption, network traffic, and power consumption were analyzed. Three machine learning models—Random Forest, Naïve Bayes, and Support Vector Machine (SVM) were trained and assessed based on Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and an Equivalent Accuracy metric. Among them Random Forest model performed the best, achieving an RMSE of 0.16 and an accuracy of 96.8 %. To improve the interpretability of the model Explainable Artificial Intelligence (XAI) techniques were applied, specifically SHapley Additive explanations (SHAP), to evaluate feature importance. The findings demonstrated that the most important variables which influence energy efficiency are CPU usage and memory consumption. This work presents a system level integration of SHAP guided VM scheduling rather than a fundamentally new algorithm. Unlike static threshold or heuristic schedulers, our SHAP driven system adapts VM placement decisions in real time with built in interpretability. While SHAP adds an average 0.15s of per job explanation latency (0.05s on GPU), we consider this overhead acceptable given the critical need for transparent, trustable scheduling in production clouds.
26-ANSP-CC-023	**StriPre: A VM Disk Migration Prefetching Algorithm** Virtual machine (VM) cross-cloud migration involves relocating virtual machine instances between different cloud environments, offering advantages such as improved scalability, disaster recovery capabilities, and efficient resource allocation optimization. Two strategies exist for live migration: ‘‘pre-copy’’ and ‘‘post-copy’’. These methods are initially applied to memory migration, but their drawbacks, such as data redundancy and poor virtual machine IO performance are amplified in cross-cloud disk migration due to high network latency, limited transmission bandwidth, and large data volumes, thereby constraining the performance of cross-cloud virtual machine migration. To reduce the performance impact caused by the latency of cross-cloud migration, we present StriPre in this paper. StriPre is a prefetching algorithm based on disk access and striped feature design, leveraging the alternating characteristics of disk accesses and performing striping recognition on IO requests. Compared to the commonly used sequential prefetching in memory, StriPre’s prefetch hit rate has increased by 1.2× to 2.2×. Our experiments have demonstrated that StriPre can effectively reduce the virtual machine startup time during cross-cloud disk migration. Under extreme cross-cloud latency of 160ms, StriPre can shorten the startup time by 3.48× compared to sequential prefetching.

26-ANSP-CC-024	**The Confluence of Big Data and Cloud Computing in SME Adoption Strategies** Explores the adoption of cloud computing and big data technologies in small and medium enterprises (SMEs), focusing on synthesizing key factors influencing adoption. By conducting a comprehensive literature review and analyzing theoretical frameworks such as the Technology Acceptance Model (TAM) and the Technology-Organization-Environment (TOE) framework, this study proposes a novel conceptual model tailored to the unique socio-economic context of SMEs in the MENA region. The methodology includes an analysis of 30 research articles, highlighting enablers and barriers to adoption. Key contributions include a taxonomy of factors and actionable insights for policymakers and practitioners. This research addresses gaps in existing studies by providing a region-specific perspective on cloud computing and big data technologies adoption for SMEs. This strong tendency towards services provided by cloud computing is very clear, and to shape their future IT, it's worth highlighting the existence of such technology. A synthesis of the literature on cloud computing adoption was presented in this paper classifying reviews based on factors that play an important role in taking the adoption decision incorporating the theoretical frameworks. Moreover, the relationship between big data and cloud computing has been explored. In addition to proposing a synthesized findings model, this paper includes various factors derived from the literature and related theoretical frameworks. In this paper we select research articles from broadly recognized research databases, as well as undertaking a comprehensive review of these selected articles focusing on the adoption of cloud computing and big data. It also includes a bibliography containing the most relevant publications in these domains, from 2011 to 2024. By examining 30 articles, the objectives of the paper are to analyze data derived from articles as well as to study the academic frameworks used in both developing and developed nations.
26-ANSP-CC-025	**Towards Reliable Configuration Management in Clouds: A Lightweight Consistency Validation Mechanism for Virtual Private Clouds** The virtual private cloud service currently lacks a real-time end-to-end consistency validation mechan- ism, which prevents tenants from receiving immediate feedback on their requests. Existing solutions consume excessive communication and computational resources in such large-scale cloud environments, and suffer from poor timeli- ness. To address these issues, we propose a lightweight consistency validation mechanism that includes real-time incremental validation and periodic full-scale validation. The former leverages message layer aggregation to enable tenants to swiftly determine the success of their requests on hosts with minimal communication overhead. The latter utilizes lightweight validation checksums to compare the expected and actual states of hosts locally, while efficiently managing the checksums of various host entries using inverted indexing. This approach enables us to efficiently validate the complete local configurations within the limited memory of hosts. In summary, our proposed mechanism achieves closed-loop implementation for new requests and ensures their long-term effectiveness.