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# Cloud Computing Paradigm For KID Model Driven Things-Edge-KID Model Into TEC-Traffic Data As A Service

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***Abstract: The intelligent traffic system can be developed and benefit from loT technologies. In recent years, number of devices increasing and are connected to the loT and heterogeneous data sources generate as new kind. This leads to extended dimensions of data space traffic system. Although that reduce computational load on loT service can provide essential services. It has limitations: high latency, high network bandwidth consumption, and high privacy risks. To alleviate these problems, emerged to reduce edge computing computational load for acheiving TDaaS in dynamic way. However, how to drive all edge servers meet a data and work service requirements but still a key issue. To address this challenge, this article proposes a kid-driven TEC computing paradigm. That is, a novel three level transparency -of-traffic data service framework. Its aim is to serves cooperatively work with cloud server. A case study is demonstrate feasibility of proposed new paradigm with associated computing mechanisms this performance of proposed system is compared other method also.***



## I. INTRODUCTION

The exponential growth of loT devices such as smart vehicles, wireless sensors and surveillance cameras, which is of great benefit in industry daily life and variety of large amount of data collected, the uses these datas not only support transportation systems, also supports traffic data service in dynamic way. However, understand real-time traffic system such as, moving patterns also mining algorithms are required.

Recently, cloud computing emerged leading computing paradigm. It supports on-demand access to large amount of computing resources and data providing at anytime from anywhere via internet. Traffic data as a service (TDaaS) aims to provide integrated data fused from intelligent traffic systems. Namely, enabling traffic services without need to know how the knowledge has been discovered by data or how the data are integrated and data providers.

A cloud-only platform has four limitations and data providers for TDaaS:

The cloud consumes large amount of network bandwidth transmitting large amount of data loT service.

If providing data services via the internet delays real-time applications.

Processing huge volume of data computationally load on the cloud.

Increasing risks of privacy violation sensitive data exposed on internet.

The emergences of edge computing new paradigm between cloud platforms and loT services such as, fog computing and mobile edge computing, have been presented in recent years. They mainly optimize cloud system by performing data edge network, near source of data, which significantly reduce data flows, response time of data services and network bandwidth occupation because loT devices are accessible edge server without passing through a internet. However, the mostly focused architecture combine communication infrastructures and edge computing, not on data provision.

To this end, this article we propose a knowledge-information-Data(KID)-driven TDaaS edge computing(TEC) paradigm. The main idea of TEC by utilizing and providing edge computing and service host, the computational load of cloud server is shared that removes bottle-neck for cloud-only platforms and major transmission. Moreover, privacy risks leak is reduced. The proposed paradigm is similar to edge mobile computing, a data service network architecture enabling cloud and edge of data network. However to enable TEC automatically, a fusion engine and knowledge discovery is needed to enhance cloud and edge computing. In both services requests data provisioning. This enables even knowledge fusion, data flow and information assimilation there are dynamically take implementation of three-level transparent approach namely, transparency for services, transparency of data and transparency of models and aware of tasks and situations provided by KID model.

The rest of this article is organized as follows: the architecture of TEC paradigm is described followed by transparency enabled KID model that shows how the combination of KID and TEC benefits to TDaaS.

## II. KID DRIVEN

TEC Computing paradigm for TDaaS:

TDaaS is an objective-oriented system that transparently fuses mined features and discovered knowledge for traffic service. The TEC paradigm enables computation and distributed edge to the cloud servers, which are closer to loT devices. However, how effectively and efficiently and efficiently direct data processing and balance the resources still challenge in TEC paradigm.

## III. ENABLING TRANSPARENT ON-DEMAND SERVICES

In the previous TDaaS architecture, all the datas are distributed but links in the data cloud. Upon receiving a service request, the cloud processes prior data knowledge continued triple vocabulary, algorithm and graph. Here vocabulary holds necessary description of relations, datatypes and properties; algorithm holds mining and data processing, graph holds entity relations. This system achieves TDaaS three-level transparency.

Data collection is transparent to data users.

Data integration is transparent to data providers.

The data as a service is transparent to both data users and providers.

The main four components of TDaaS systems are DaaS agent, DataSource service centre, transparent client, transparent server, in an On-Demand service mode, all the data in service model. TDaaS are designed for transparent services. For example: Each traffic data as its own characteristics; vehicle trajectory needs a complex model includes time series in GPS location and matching them to road network. While video data requires vehicle profiles and moving patterns that is, not every node process same kind of data, to take into storage capacity and connectivity.

Whenever data is required sent into data center in the cloud, data processing and integration are conducted there. this approach has the problem of cloud-only platform to solve them, TEC paradigm as follows.

## IV. EMBEDDING THE KID MODEL INTO TEC

In cloud-only platforms, TEC is a framework that processing large set of traffic data edge server closer to loT devices. Each loT devices is connected to edge server ability to store and preprocesses as well as select or provide services.

Example: what data are required? Or what data resources are available and enable data service provision example: what resources are needed and where to send data for processing? Therefore KID model embedded into TEC framework, and drives dynamic traffic situation and service requirements. This coordinates the edge server and cloud resource allocation, enabling practical application and efficient network bandwidth usage.

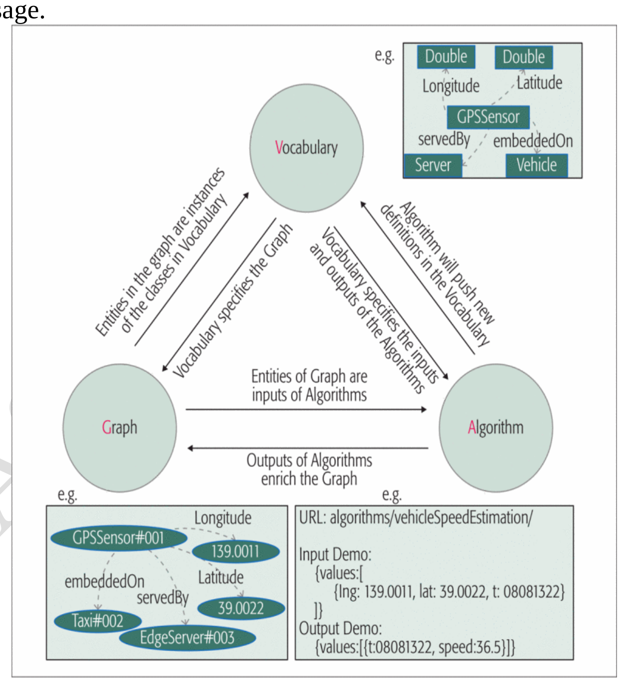


*Figure 1*

The KID model has three cognitive stages: instantiation, interpretation and assimilation, all three stages requires prior knowledge therefore, k-store is the core element. Vocabulary is a collection of datatype including potential properties and relation among them. Several standard vocabularies DBPedia, YAGO, and schema.org.

Graph is a knowledge representation composes links and vertices. A vertex represent a entity, and link nodes relation between two entities. Entities in graph can input of algorithm and output of algorithm graph is return the whole graph as a set of entities and their relations. Which are defined in vocabulary.

Algorithm is a pool that holds executable programs. Although regarded knowledge that extract features, discover moving patterns, or decision making. They cannot be represent in graph. They are developed run-time environment exported other terms as a service.

## V. OVERVIEW OF KID-DRIVEN TDAAS SYSTEM

When TEC paradigm is embedded with KID model it enhanced to cognitive ability to smartly.

Edge server for processing or direct data to the cloud.

Direct information that is, global or local k-store of assimilation.

Local k-store for fusion or direct knowledge for cloud sharing.

Therefore, only the necessary data and information knowledge sent to cloud. The KID model uses interpretation for incoming data, installation for knowledge of services and assimilation of interpreted information. The KID model embedded in edge server that is, instanitation, assimilation, interpretation, during these processes some data or information are stored in D-store, I-store and k-store but some sents to cloud. The edge server workers provide directly back to loT devices other edge servers are not required that is future lot services are transparent clients both service receives and data collectors in local processing model without going through internet to the cloud.

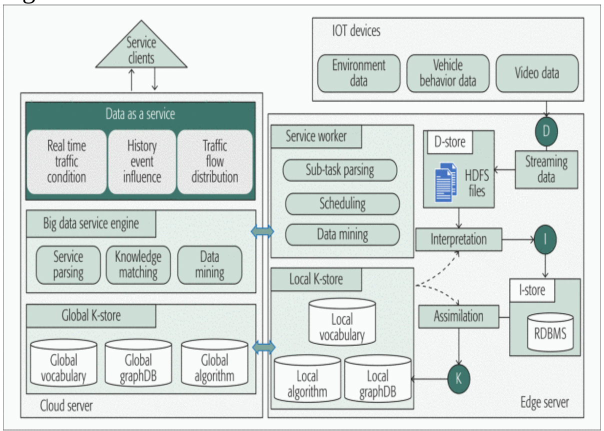


*Figure 2*

For some cases, the source data or intermediate result to be sent to cloud balancing resource network bandwidth and network traffic condition is a key issue. How the KID model enables the three-level transparency.

## VI. INTERPRETATION FOR DATA TRANSPARENCY

After data collected loT devices are outside information systems endowing data which is stored in the k-store, to interpret it. This process expressed as follows,

interpretation():{D11,D12,…,D1m}→KI1(1)

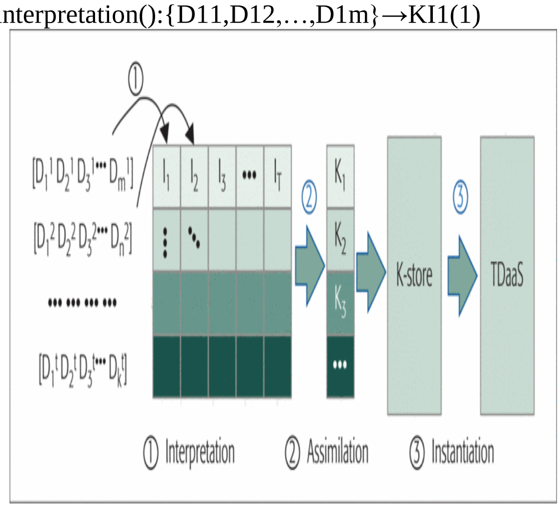


*Figure 3*

Where D;1,D'2….,D'm represents input data I1 represents newly produced and k on arrow pre-defined knowledge in the k-store. This indicates new information more than one data source may used.

This process is transparent data model model and each data model is bound with specific interpretation () the data system recognize incoming data and input produces the wanted information.

## VII. ASSIMILATION FOR MODEL TRANSPARENCY

The newly generated assimilation () into the body k-store linking to relevant existing knowledge. This means not only added new entities, new relation established.

assimilation():{I1,I2,…,It}→KK1(2)

Where I1,I2,….It represent interpretation parse and k1 is new knowledge and added into k-store. This process is transparent triggered by by former processes, automatically absorbs and puts knowledge into correct position on either cloud or edge servers.

## VIII. INSTANTITATION FOR SERVICE TRANSPARENCY

Knowledge must be instantiated by instantiation () function before solve a problem or use applications this enables knowledge to real-world problems. TDaaS is a good example of this application

This problem defined as;

instantiation():K1→K2Service(3)

Where k1 is the knowledge which service provided to specific requests for instance, TDaaS traffic condition is required that correctly describe the kind of knowledge.

The providers example shows transparent service that holds the details how service provided by consumers.

A complex model is need to link and match them on road. About 1000 vehicles pass through millions of records must be processed. A surveillance camera with 720P (1280*720) produces 42GB per video which is send to edge streaming data. KID –Driven TEC simulates video files about 100MB about 1GB in size unstructured videos.

For the algorithm no. of vehicles in each frame using OpenCv framework, first recognize background to pick moving areas, morphologic algorithm applied and caused by noise implemented in python sandbox uses 54MB.

Within the TEC, the edge server processed and received video stream and discover different moving patterns caused traffic accidents edge server refers the result to cloud knowledge.

loT devices collect data cloud transmitting , datas with datas decision making.

loT devices collect process and data into knowledge that all are sends to cloud.

loT devices collect data and transmit to edge servers. Edge servers process data and the result to cloud.

The local k-store is operated in dynamic which means vocabulary, graph and algorithm from dynamically in cloud and flushes knowledge temporary every time performed (KID-TEC).

The performance of each scenario involves time latency through the internet and computation load to cloud server. The specific comparison between TEC and KID-TEC. TC1 and TC2 spend more time data transmitting through internet. Both TEC and KID-TEC offering low latency TEC supports, transmits smaller amount of data via internet and less network bandwidth. Load knowledge and k-store from cloud in on-demand way. However, only TEC results of video processing transmits separate from privacy information, so it's safer.

## IX. CONCLUSION AND PERSPECTIVES

The proposed TEC computing paradigm can embedded with KID model. Both TEC and KID supports low-level latency and share global awareness local responses. Moreover it optimizes information now, dataflow and knowledge generation. In this article, KID model plays an important role in incoming data into use of traffic data as a service. KID-driven TEC computing paradigm has data-driven knowledge discovery, knowledge evolution and knowledge generation three-cycle stages of data to knowledge and interaction with external world receiving data from loT devices.

As a novel, computing paradigm KID-Driven edge could be important research topic such as, cloud and edge server can focus not only TDaaS focus on various services. In this article it may be possible to setup mechanism for TEC service contributed to TEC computing paradigm on this common shared platform. Note that cloud that role of manager control and interact with coordinating edge services can be connected and disconnected. Moreover, deep learning together with KID model. TEC computing are provide appropriate input and output of deep learning algorithm.

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