

第2回「オープンアクセス新任担当者相談会」実務紹介(1)

学術コミュニケーションと機関リポジトリの基礎知識

2023年8月8日 JPCOAR イベント運営作業部会



1. 学術コミュニケーションの基礎知識

- ① 学術雑誌とはどのようなものか
- ② 論文とはどのようなものか
- ③ オープンアクセスとはどういうことか

2. 機関リポジトリの基礎知識

- ① 機関リポジトリとは
- ② 機関リポジトリのシステム連携



1. 学術コミュニケーションの基礎知識

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- ③オープンアクセスとはどういうことか



科学的発見/知見

それを生み出した のが私だと世界 に認知してほしい

その科学的真価 を認めてほしい

世に広まって ほしい 後世にも伝えたい

"Smaismrmilmepoetalevmibunenugttaviras" altissimum planetam tergeminum observari. 4

1. 学術コミュニケーション ①学術雑誌とはどのようなものか



それを生み出した のが私だと世界 に認知してほしい

"学術雑誌の4機能"

論文の先取 権の確立 査読による 質の保証 その科学的真価 を認めてほしい

世に広まって ほしい *知見を世に 知らせる 知見を後世に伝える

√ 後世にも伝え 〜 たい

ヘンリー・オルデンバーグ氏の書簡(1664~1665)より。同氏は、世界最古の学術雑誌と言われる イギリス王立協会「フィロソフィカル・トランザクション」(1665~)創刊時の事務総長



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むしろ著者がお金(例えば20万円とか)を 払うケースもある。

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 - 研究論文執筆・公開の目的は金銭でなく、著作が広く行き渡り、科学の発展に寄与すること
 - ・収入は所属機関の給与など。学術的名声を得て、ポストを獲得することが間接的に収入に寄与

1. 学術コミュニケーション ①学術雑誌とはどのようなものか



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Research

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Subject Areas:

destrical engineering, applied mathematics. systems theory

power packet, router, network flow problem, dectrical energy network

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Power packet transferability via symbol propagation matrix

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A power packet is a unit of electric power composed of a power pulse and an information tag. In Shannon's information theory, messages are represented by symbol sequences in a digitized manner. Referring to this formulation, we define symbols in power packetization as a minimum unit of power transferred by a tagged pulse. Here, power is digitized and quantized. In this paper, we consider packetized power in networks for a finite duration, giving symbols and their energies to the networks. A network structure is defined using a graph whose nodes represent routers, sources and destinations. First, we introduce the concept of a symbol propagation matrix (SPM) in which symbols are transferred at links during unit times. Packetized power is described as a network flow in a spatio-temporal structure. Then, we study the problem of selectine an SPM in terms of transferability, that is, the possibility to represent given energies at sources and destinations during the finite duration. To select an SPM, we consider a network flow problem of packetized power. The problem is formulated as an M-convex submodular flow problem which is a solvable generalization of the minimum cost flow problem. Finally, through examples, we verify that this formulation provides reasonable packetized power.

1. Introduction

Electric power has been considered as a continuous flow based on circuit theory, in which power flow is governed by Kirchhoff Laws and Tellegen's theorem [1]. The circuit theory can be generalized to represent various nonlinear complex systems in the system topology with energy dissipation and energy storage as a network

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on theory [3] that 'all technical all technical communications of random binary digits' [4]. nner by using packet switching, ynamic assignment of network er, power distribution will be r, we consider electrical energy ver packetization [6-15].

mage complicated power flows regulation [16]. In the proposal, rere installed into the electrical e according to the flow control for the difference between the ork, power packet transactions e concept of power packet also ciure, rooted in lessons learned ened for distributed renewable 'Energy packet networks' were servers [20]. There is a proposal r is delivered through discrete versal power router is designed nd, in most of these proposals, nysical design is not mentioned. ith electric power in the same power has been high-power sed with low-power and highical layer and the logical layer, aging power

con carbide (SiC) and gallium device operation at potentially current SI technology [23,24]. high-frequency switching over high-frequency electricity, and In the developed system, an ket with its voltage waveform. dual packet level. A schematic The system consists of network inding to the tag's information. power due to different sources. send the power packets using

the power at each line by using the nits to identify the different kinds ackets between routers [10,14,15]. ransfer. In Shannon's information gitized manner [3]. Referring to this inimum unit of power transferred ymbol is a minimum unit of power, ansferred during a unit time in the y determined as a real number.1,2 messages and energy with symbol of messages is treated as a coding the length of codewords. In power en energy during a finite duration resentation is a problem unique to ed with a set of symbol sequences

ation, which was introduced in [12]. on problem of power packetization. etworks. Then, packetized power is and quantized manner: a symbol is is represented with symbols sent to

d power, we refer to the work about sequences [27,28]. In this work, to over a sufficiently long time period ies are designed by prioritizing the firected acyclic graphs whose edges with their matching probability in

w concept to represent packetized mporal correspondence. In power each symbol has its energy and poral connectedness is important in 'strain', i.e. the spatial difference stored in each router. Then, we ferability, that is, the possibility to g the finite duration. To select an er, weighting supplied energy from energy at each link during each unit he problem is formulated as an Malization of the minimum cost flow

provides reasonable transmission wer with a network flow problem, rgy packet networks with queueing ly different from our problem, it is sing a specific system similar to the discuss our formulation referring to

inuted as resistive. Thus, power is discussed

ingle symbol. The proporties that symbols do terms of redundancy of the system.

a power pulse with an information tag. Here, packetized power is spatially and temporally transferred as symbols in a digitized and quantized manner. At each node, the energy is represented as the total amount of energy of symbols which are sent to and received from neighbouring nodes during a finite duration.

To mathematically represent such transmission of packetized power, we introduced the SPM. in which a symbol is transferred at a link during a unit time. Via SPM, packetized power is described as a network flow in a spatio-temporal structure. Then, we considered a network flow problem for selecting an SPM in terms of transferability, that is, the possibility to represent given energies at sources and destinations during the finite duration. In networks, packetized power appears as supplied energy from sources and supplied energy to destinations (V1), transferred energy at each link during each unit time (V2), and change of stored energy in each router (V3). Setting a laminar family of subsets of nodes in spatio-temporal structure for the costs of V1 and V3, we can formulate this problem as an M-convex submodular flow problem which is a solvable generalization of the minimum cost flow problem. Unlike conventional minimum cost flow problems, here, we weighted not only values of network flow (V2) but also values of boundary of network flow and their time integrals (V1 and V3). Finally, the formulation was discussed through examples and it is shown that power can be packetized and be controllable while preserving reasonable properties of power.

The established packet-centric framework is completely different from the circuit theory, in which power is handled in a continuous manner and is governed by Kirchhoff Laws and Tellegen's theorem [1]. Here, the concept of a power packet is introduced as a unit of electric power, so that power is digitized and quantized. The results of this paper suggest a mathematical framework which integrates energy and information in electrical energy networks.

lists acceptability. This work does not have any experimental data. All computational results were obtained with the cycle-cancelling algorithm [29]

luttors' contributions. The concept of SPM was conceived by S.N. and A.M. The network flow problem was formulated and numerically simulated by S.N. T.H. designed the power packet network and initiated the study. The paper was drafted by S.N. and carefully revised by all the authors. All authors gave final approval

in itims). We declare we have no competing interests

of this work were financially supported by the Cross-Ministerial Strategic Innovation Program w Energy and Industrial Technology Development Organization, Japan, and by the Super Cluster Program (Kyoto) from the Japan Science and Technology Agency. The work of the author (S.N.) was financially supported, in part, by Kyoto University.

Actnowledgments. The author (S.N.) thanks the current and former members of the Robotics, Perception and Learning Laboratory of the Royal Institute of Technology (KTH) for fruitful discussions. The authors acknowledge three anonymous referees for their helpful comments on the initial draft.

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systems theory

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この論文の題名

この論文の著者

自然科学分野では複数名 の共著であることが多い

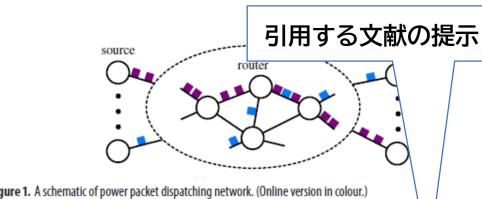
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この例では1に所属する著 者が2名、2が1名

著者を表す記号 [ORCID]

この例は筆頭著者の縄田 信哉先生のもの

jpcoar



ermodynamics [2]. Here, energy flow is handled in a continuous manner under the conservation energy. On the other hand, it is shown in Shannon's information theory [3] that 'all technical emmunications are essentially digital; more precisely, that all technical communications e equivalent to the generation, transmission and reception, of random binary digits' [4]. Emmunication networks have been developed in a digitized manner by using packet switching, hich breaks messages into smaller pieces named 'packets', for dynamic assignment of network sources [5]. If we handle electric power in a digitized manner, power distribution will be langed completely different from the conventional. In this paper, we consider electrical energy

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Data accessibility. This work does not have any experimental data. All computational results were obtained with the cycle-cancelling algorithm [29].

Authors' contributions. The concept of SPM was conceived by S.N. and A.M. The network flow problem was formulated and numerically simulated by S.N. T.H. designed the power packet network and initiated the study. The paper was drafted by S.N. and carefully revised by all the authors. All authors gave final approval for publication.

Competing interests. We declare we have no competing interests.

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科学の発展=先人の業績を踏まえ、新たな知見を積み足す

- 参考とした先行研究に対しては引用という形で礼を尽くす
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(参考)掲載した論文が多く引用されると、その雑誌自体の評価が上がる (それを数値化したものとして「インパクトファクター」がある)

ower levels directly to customers [21]. In the physical layer, a universal power router is designed and evaluated for residential applications [22]. On the other hand, in most of these proposals,

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論文が学術雑誌に掲載されるまで

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学術情報の流通不全からオープンアクセス思潮へ

- 世界の拡大、人口の増加、産業の発達、 科学の拡大、生まれる科学的知見の増大
- 論文数の増加、学術雑誌の増加
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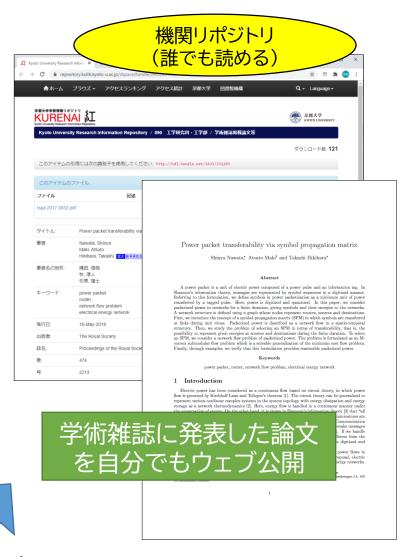
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1. 学術コミュニケーション ③オープンアクセスとはどういうことか









Nawata S, Maki A, Hikihara T. (2018)

Power packet transferability via symbol propagation matrix.



2. 機関リポジトリの基礎知識

- ①機関リポジトリとは
- ②機関リポジトリのシステム連携

2. 機関リポジトリの基礎知識 ①機関リポジトリとは



<当初>

大学などの研究機関に所属する研究者が、 論文などをインターネット上に保存し発信する「セルフ・アーカイブ」を行うためのプラットフォームサービスとして開始 * 1)

<現在では>

電子ジャーナル化された紀要や電子書籍の発行、電子化された稀少資料の公開など、 研究機関が各機関内に所有している学術情報を総合的に管理・発信するための基盤へと発展

*1)Clifford A. Lynch, "Institutional Repositories: Essential Infrastructure for Scholarship in the Digital Age", ARL Bimonthly Report, no. 226 (February 2003): 1-7.

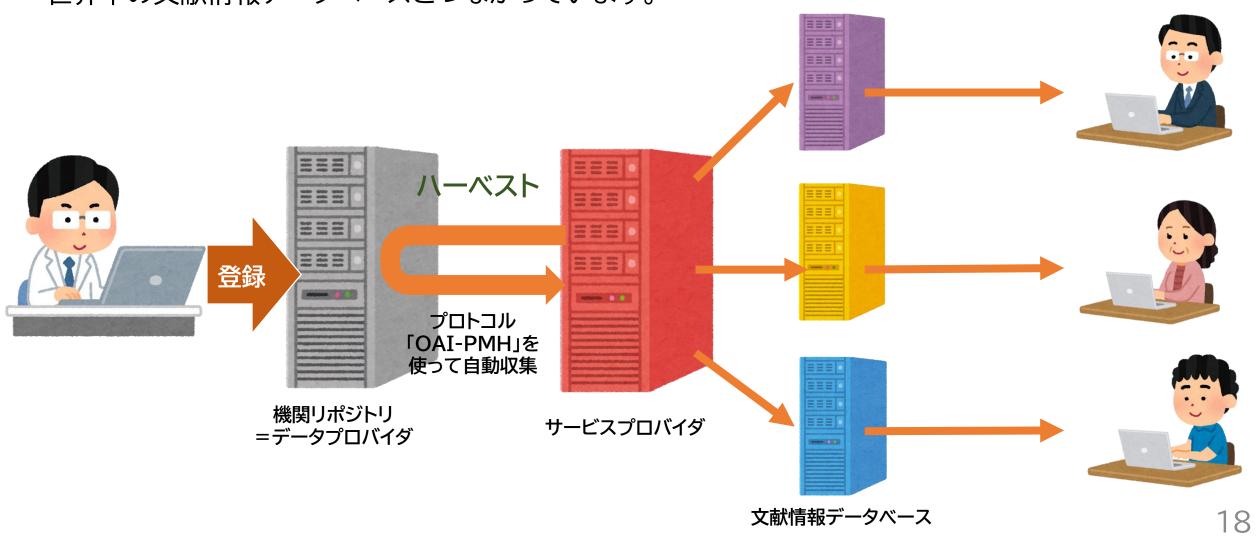
https://www.cni.org/publications/cliffs-pubs/institutional-repositories-infrastructure-for-scholarship, (参照2023-07-13)

邦訳:Clifford A. Lynch「機関リポジトリ:デジタル時代における学術研究に不可欠のインフラストラクチャ」『ARLリポート』 226. 2003年2月号 https://www.nii.ac.jp/irp/archive/translation/arl/, (参照2023-07-13)

2. 機関リポジトリの基礎知識 ②機関リポジトリのシステム連携

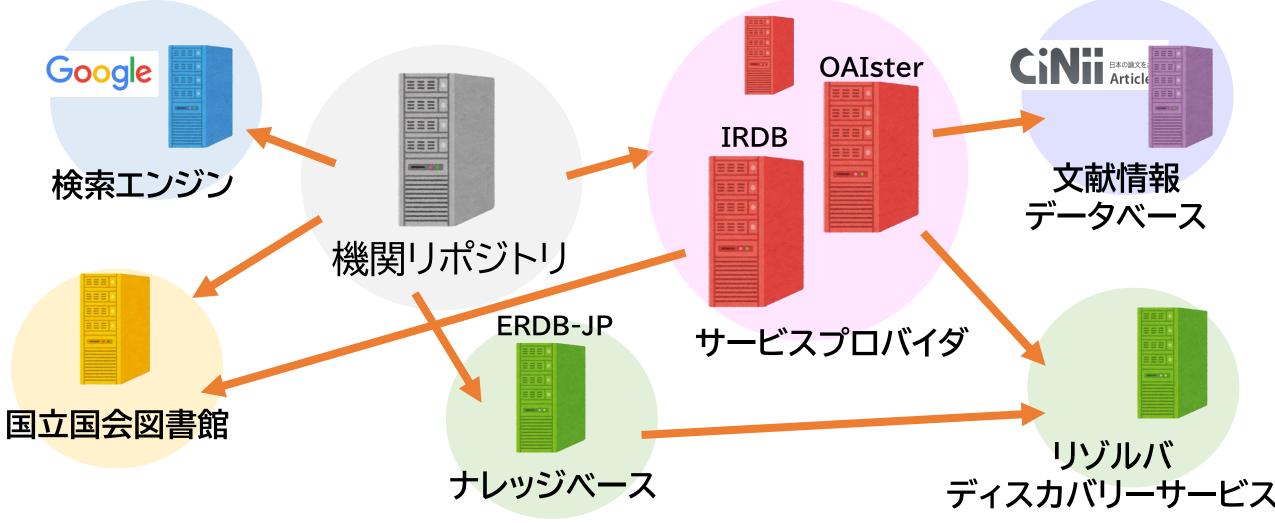


機関リポジトリは、登録されたコンテンツのデータを様々なシステムへと受け渡すことで、 世界中の文献情報データベースとつながっています。



2. 機関リポジトリの基礎知識 ②機関リポジトリのシステム連携





(神話)NIIとのシステム連携が重要

(真実)世界中の情報検索サービス機関とのシステム連携が重要。NIIはOne of them



これで本講は終わりです。