**Table 7** Statistics of core nodes in main evolution paths of LIS discipline

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** |
|  | ontology, information retrieval, semantic web, methodology, classification | electronic health record, health information technology, data mining, standards, governance | electronic health record, machine learning, natural language processing, precision medicine, text mining | electronic health record,  patient safety, clinical decision support, natural language processing, health information technology | electronic health record,  data sharing, patient safety, health information technology, data quality | ∅ |
|  | *information retrieval, natural language processing, digital library, classification, activities and operations* |  |  |  |  |
|  | academic library, information literacy, library, open access, china | information literacy, library, case study, librarianship, students | academic library, information literacy, library, evaluation, collaboration | academic library, information literacy, higher education, library, library instruction | information literacy, academic library, education, collaboration, library | academic library, information literacy, higher education, library, library instruction |
|  | academic library, public library, user study, document delivery, interlibrary loan |  |  | *digital library, ontology, information retrieval, metadata, user study* | **classification, information behaviour, documentation, document, information** |
|  | social media, internet, facebook, twitter, social network | social media, trust, twitter, satisfaction, cloud computing | social media, china, privacy, facebook, twitter | *trust, e-government, privacy, adoption, digital divide* | social media, big data, social network, twitter, facebook | **machine learning, electronic health record, big data, information retrieval,**  **natural language processing** |
|  |  | knowledge management, innovation, knowledge sharing, information technology, information system | knowledge management, knowledge sharing, innovation, case study, information technology | knowledge management, knowledge sharing, innovation, case study, information technology | *adoption, structural equation modelling, e-government, digital divide, case study* |
|  |  |  | social media, twitter, facebook, social network, social capital |  | social media, facebook, twitter, social network, internet |
|  |  |  |  |  | knowledge management, knowledge sharing, innovation, trust, china |
|  | knowledge management, innovation, knowledge sharing, collaboration,  knowledge transfer | knowledge management, knowledge, knowledge sharing, innovation, collaboration | classification, knowledge, information, thesauri, wikipedia | classification, knowledge organization, ontology, metadata, information | ∅ | ∅ |
|  | bibliometrics, citation analysis, web of science, research evaluation, citation | bibliometrics, citation analysis, open access, scientometrics, altmetrics | bibliometrics, citation analysis, social network analysis, scientometrics, h-index | bibliometrics, citation analysis, web of science, research evaluation, altmetrics | bibliometrics, citation analysis, scientometrics, altmetrics, open access | bibliometrics, scholarly communication, citation analysis, research evaluation, open access |
|  | qualitative, lived experience, health care, illness and disease, interviews | qualitative, health care, interviews, grounded theory, illness and disease | qualitative, health care, interviews, relationships,  illness and disease | qualitative, interviews, health care, australia, communication | qualitative, qualitative method, health care, interviews, canada | qualitative, health, canada, lived experience,  mental health and illness |

**Table 8** Statistics of core nodes in main evolution paths of CS discipline

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** |
|  | cloud computing, security, quality of service, privacy, internet of things | security, privacy, cryptography, authentication, trust | cloud computing, big data, mapreduce, performance evaluation, virtualization | ∅ | ∅ | ∅ |
|  | cloud computing, scheduling, big data, quality of service, virtualization | security, privacy, authentication, cryptography,  access control |  |  |  |
|  | performance, algorithm, design, wireless sensor network, reliability | wireless sensor network,  energy efficiency, routing, wireless network,  cognitive radio | wireless sensor network,  energy efficiency,  internet of things,  scheduling, routing | *internet of things,*  *cloud computing,*  *wireless sensor network,*  *security, energy efficiency* | *internet of things,*  *cloud computing,*  *wireless sensor network,*  *security, energy efficiency* | *internet of things,*  *cloud computing, security,*  *wireless sensor network,*  *energy efficiency* |
|  | **algorithm, performance, design, theory, experimentation** | **algorithm, performance, design, reliability, theory** | **algorithm, performance, reliability, design, field programmable gate array** |  |  |
|  | ontology, social media, social network, knowledge management, semantic web | security, privacy, cryptography, authentication, trust | security, privacy, authentication, cryptography, access control | **big data, social media, social network, ontology,**  **electronic health record** | ontology, simulation, virtual reality, software engineering, performance | **cryptography, computational complexity, image encryption, algorithm, finite field** |
|  | *data mining, ontology, social media, social network,*  *text mining* | ontology, social media, social network, recommender system, electronic health record |  | *social network, recommender system, bibliometrics, complex network, community detection* | ontology, recommender system, social network, virtual reality, collaborative filtering |
|  | genetic algorithm, neural network, optimization, particle swarm optimization, simulation | genetic algorithm, optimization, particle swarm optimization, evolutionary algorithm, multi-objective optimization | *optimization, genetic algorithm, particle swarm optimization, multi-objective optimization, evolutionary algorithm* | **neural network, adaptive control, stability, nonlinear system, multi-agent system** | *optimization, genetic algorithm, particle swarm optimization, multi-objective optimization, evolutionary algorithm* | adaptive control, nonlinear system, multi-agent system, stability, sliding mode control |
|  | adaptive control, multi-agent system, nonlinear system, time-varying delays, synchronization | **neural network, adaptive control, multi-agent system, nonlinear system, stability** | *optimization, genetic algorithm, particle swarm optimization, multi-objective optimization, evolutionary algorithm* | adaptive control, stability, nonlinear system,  optimal control,  time-varying delay | *optimization, genetic algorithm, mathematical model, multi-objective optimization, particle swarm optimization* |
|  | support vector machine, classification, machine learning, clustering,  feature selection | support vector machine, classification, machine learning, feature selection, feature extraction | *classification, machine learning, support vector machine, feature extraction, clustering* | *classification, support vector machine, machine learning, feature extraction,*  *feature selection* | machine learning, deep learning, convolutional neural network, classification,  feature selection | *deep learning, convolutional neural network, feature extraction, image segmentation, image classification* |
|  |  |  |  | **feature extraction, image segmentation, support vector machine, image classification, medical image processing** | machine learning, classification, support vector machine, feature selection, neural network |
|  | finite element method, gpu, cuda, finite element, parallel computing | finite element method, gpu, parallel computing, cuda, computational fluid dynamic | gpu, finite element method, finite element, computational fluid dynamic, cuda | gpu, parallel computing, finite element method, cuda, computational fluid dynamic | finite element method, gpu, parallel computing,  finite element,  computational fluid dynamic | finite element method, gpu, field programmable gate array, parallel computing, cuda |