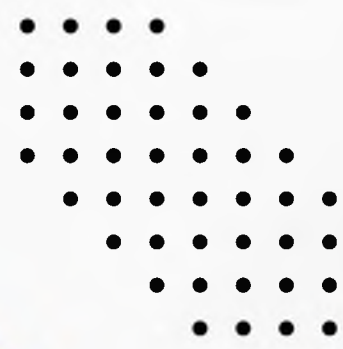


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Author Index

| | |
|--------------------------------|-------------------------|
| Abas Sunarya, Po | 166 |
| Abdurachman, Edi | 296 |
| Abu, Nur Azman | 33 |
| Achmad, Said | 335 |
| Adauwiyah, Hofifah Isma | 51 |
| Adelina, Rosa | 559 |
| Aditia Gerhana, Yana | 170, 372 |
| Adlinma, Leoni Rizki | 1 |
| Agustin, Fenty Eka Muzayyana | 401, 760 |
| Agustino, Dedy Panji | 608 |
| Aini, Qurotul | 175, 330, 360, 366, 547 |
| Aini, Qurrotul | 124, 644 |
| Al Amin, Muhammad Insan | 204 |
| Al-Khowarizmi, Al-Khowarizmi | 187, 240, 471 |
| Alam, Cecep Nurul | 130 |
| Alfiah, Fifit | 349 |
| Alfianti, Iva | 385 |
| Aliefa Rachman, Muhammad Dizza | 475 |
| Almi, Aulia Yasmin Putri | 204 |
| Alyami, Mona | 492 |
| Aminudin, Iwan | 408 |
| Amrilla, Muhammad Fitroh | 661 |
| Amriza, Rona Nisa Sofia | 16 |
| Amrizal, Victor | 414, 840 |
| Amrullah, Amrullah | 240 |
| Andika, Difa | 130 |
| Anggiaputri, Farrah | 401 |
| Anggraini, Nenny | 396, 420, 531, 801 |
| Angkasa, Harta | 335 |
| Anwar, Saipul | 341 |
| Anwas, E. Oos M | 256 |
| Aprila Yusuf, Natasya | 69 |
| Aras, Muhamad | 278 |
| Arayoga Saka, David | 39 |
| Ardi, Ardi | 39, 159 |
| Ardiyansah, Muhamad Haikal | 710 |
| Arham, Zainul | 638 |
| Arif, Basyir | 118 |
| Arifadilah, Frido | 760 |
| Arifn, Viva | 11, 391 |
| Arini, Arini | 96, 181, 710 |
| Aripiyanto, Saepul | 324, 401, 425 |
| Arisanti, Ivon | 519 |
| Ariyanto, Ferry | 547 |

| | |
|-------------------------------|--------------------|
| Arizki, Fakhri | 795 |
| Armawan Sandi, Tommi Alfian | 251 |
| Aryanti, Nabila | 696 |
| Aryanto, I Komang Agus Ady | 193, 199 |
| Asmui, Asmui | 733 |
| Astiti, Sarah | 772 |
| Astriani, Tika | 230 |
| Atmadja, Aldy Rialdy | 210 |
| Ats Tsaqofi, Waki | 391 |
| Aung, Myo Min | 438, 486, 509, 514 |
| Ayu Pratami, Wayan Cahya | 525 |
| Ayu Sanjaya, Yulia Putri | 64 |
| Ayu, Annisya | 559 |
| Azhari, Muhammad | 425 |
| Azizah, Lisma Nur | 64 |
| Azmi, Aulia | 543 |
| Azzahra, Atmina Jovanka | 396 |
| Azzahra, Shafira Fatimah | 230, 235 |
| Bagus Saputra, Dimas | 87 |
| Bahaweres, Rizal Broer | 537 |
| Bayu Suseno, Hendra | 96 |
| Bilhaq, Muhammad Thariq Sabiq | 107 |
| Bismi, Waeisul | 245, 251 |
| Bist, Ankur Singh | 166, 314, 330 |
| Boonhane, Chaiwut | 503 |
| Boonkon, Somsamai | 498 |
| Budaya, I Gede Bintang Arya | 608 |
| Budiarto, Mukti | 75 |
| Budiawan Zulfikar, Wildan | 204 |
| Budiman, Ichsan | 372 |
| Candra Sulyani, Agnesia | 525 |
| Candra, Sevenpri | 1 |
| Catur Utami, Meinarini | 795 |
| Chang, Chwen-Li | 519 |
| Chawaphan, Pharan | 564 |
| Christian, Christian | 1 |
| Crisnapati, Padma Nyoman | 438, 564, 766 |
| Cucus, Ahmad | 728 |
| Damayanti M.S., Rumika | 744 |
| Darma, I Wayan Agus Surya | 602 |
| Dewi, Ni Putu Juni Rahayu | 602 |
| Dewi, Ratna Sari | 656 |
| Dewi, Susanti | 33 |
| Dharmendra, I Komang | 608 |
| Dhika, Muhammad Arya | 391 |

| | |
|---|-----------------------|
| Dian Permatasari, Anggraeni | 256, 341 |
| Durachman, Yusuf | 11, 51, 181, 463, 475 |
| Dwi Wulandari, Retno | 739 |
| E. Widjaja, Andree | 319 |
| Efendi, Syahril | 240 |
| Eka Asri, Aprily | 651 |
| El Hadi, Rosad Ma'Ali | 230 |
| Elisa Nalawati, Rizki | 633 |
| Epriani, Nadila Chataliya | 124 |
| Fadhillah, Khair | 531 |
| Fadilah, Asyifa Tasya | 701 |
| Fadiyah, Alifah | 633 |
| Fadlan Riady Bachri, Syaifan | 801 |
| Fadli, Ihya Syihabul | 33 |
| Faeruz, Ratna | 733 |
| Fahri, Muhamad | 272 |
| Fahrianto, Feri | 220, 385 |
| Farell, Darren | 335 |
| Faridah, Ida | 39 |
| Fattahaq, Rafif Zaki | 408 |
| Faturahman, Adam | 543 |
| Fauzan, Ridho Dhafi | 224 |
| Fauzia, Amelia | 778 |
| Febriansyah, Yusuf | 754 |
| Fetrina, Elvi | 124, 795 |
| Fiade, Andrew | 324, 391, 425 |
| Firmansyah, Firmansyah | 245, 251 |
| Fitri, Fifi Alfisa | 141 |
| Fitrianah, Devi | 335 |
| Fitriyani, Aida | 146, 152 |
| Fitriyati, Nina | 696 |
| Fitroh, Qorry Aina | 308 |
| French, Evaewero | 22 |
| Friandi, Sendy Zul | 75 |
| Ganesan, Yuvaraj | 614 |
| Gerhana, Yana Aditia | 204, 210 |
| Ginatra, Ni Luh Wiwik Sri Rahayu | 602 |
| Girinzio, Iqbal Desam | 166 |
| Gui, Anderes | 614 |
| Gumay Putri, Anggita Maharani Gumay Putri | 716 |
| Gunawan, Muhamad Nur | 51, 817, 829 |
| Hadi Fathulloh, Ahnaf | 146, 152 |
| Hakim, Nashrul | 806 |
| Hamzah, Muhammad Luthfi | 82 |

| | |
|------------------------------|---|
| Handayani, Rizqi | 829 |
| Hanifa Setianingrum, Anif | 671 |
| Hanifa, Fanni Husnul | 626 |
| Harahap, Eka Purnama | 56 |
| Hardini, Marviola | 64, 314, 547 |
| Harmaini, Harmaini | 28 |
| Harsemadi, I Gede | 608 |
| Hartomo, Kristoko Dwi | 175, 302, 366 |
| Hartono, Ambran | 481 |
| Haryani, Calandra Alencia | 319 |
| Haryanto, Tri | 113, 789 |
| Hasanati, Nidaul | 638, 704, 811 |
| Helo, Petri | 6 |
| Henderi, Henderi | 75, 87 |
| Hendrawan Putra Wijaya, Erik | 335 |
| Hendry, | 360 |
| Hendry, Hendry | 302 |
| Heriyanto, Raden | 102 |
| Heru Riza Chakim, Mochamad | 87, 547 |
| Hery, Hery | 319 |
| Hidayah, Nur Aeni | 215, 644, 829 |
| Hidayanto, Achmad Nizar | 290 |
| Hidayat, Didin Nuruddin | 656 |
| Hidayati, Sri | 778 |
| Huda, Muhammad Qomarul | 492, 823 |
| Hulliyah, Khodijah | 136, 324, 385, 396, 661, 671, 701 760, 840 |
| Husain, Muhammad Kamil | 284 |
| Huzaifa, Malisa | 554 |
| Huzaifah, Muhamad Lutfi | 284 |
| Ilamsyah, Ilamsyah | 749 |
| Ilman, Abdul | 22 |
| Inayah, Nur | 696 |
| Indrawan, I Gusti Agung | 602 |
| Indrianti, Yasinta | 691 |
| Irfan, Mohamad Ali | 701 |
| Iriani, Ade | 302 |
| Irvan, Irvan | 187 |
| Isnaini Dwi Ningsih, Nunung | 385 |
| Istiharini, Istiharini | 266 |
| Iswara, Ratna Widya | 744 |
| Ivone, Merliani | 113 |
| Janratchakool, Weena | 766 |
| Jansengrat, Parinya | 766 |
| Jean Liou, Ren | 564 |
| Jonas, Dendy | 355 |

| | |
|-----------------------------|---|
| Julianingsih, Dwi | 355 |
| Jumadi, Jumadi | 130, 170 |
| Kadim, A | 749, 754 |
| Kamal, Mustofa | 749 |
| Kamiyama, Noriaki | 220 |
| Kasma, Utin | 260 |
| Katduang, Tawan | 571 |
| Kedah, Zulkarnain | 33 |
| Ketsayom, Singhanart | 514 |
| Khairani, Dewi | 11, 378, 385, 391, 396, 401, 408 414, 425, 682 |
| Khalil, Ismail | 728 |
| Khalisha, Nazla | 256 |
| Kharlie, Ahmad Tholabi | 324 |
| Khoffah, Nimatul | 56 |
| Khothibulumam, Aan Adrian | 372 |
| Khudzaeva, Eva | 215, 463, 475, 644 |
| Klinklai, Sillapachai | 589 |
| Kosasi, Sandy | 33, 260, 330 |
| Kristianto, Budhi | 75 |
| Krohkaew, Jaturapith | 766 |
| Kumaladewi, Nia | 118, 492, 817 |
| Kurniawan, Lukas | 691 |
| Kusumahadi, Krishna | 626 |
| Kusumaningtyas, Rinda Hesti | 704 |
| Kusumawati, Dyah | 829 |
| Kuway, Susanty Margaretha | 260 |
| Laoopugsin, Niyom | 583 |
| Larasati, Niken | 525 |
| Lathifah, Ari | 638 |
| Latifa, Rena | 651 |
| Lestari Santoso, Nuke Puji | 39 |
| Liebenlito, Muhaza | 696 |
| Liliana, Dewi Yanti | 744 |
| Liming, Bryan | 319 |
| Lubis, Arif | 82 |
| Lubis, Arif Ridho | 187, 240 |
| Lubis, Muharman | 187, 230, 235 |
| Luhukay, Devyano | 614 |
| Lukita, Chandra | 28, 56, 159, 175 |
| Lukman, Nur | 170 |
| Lutfiani, Ninda | 547 |
| M. Anwas, E. Oos | 341 |
| Ma'Mun, Andri | 69 |
| Ma'Ruf, Imam | 39 |

| | |
|------------------------------|---|
| Madani, Muchlishina | 432 |
| Mahendra, Muhammad | 772 |
| Manalu, Sonya Rapinta | 691 |
| Manaqib, Muhammad | 696 |
| Maneetham, Dechrit | 193, 199, 438, 451, 457, 486, 498 509, 514, 564, 571, 577, 583, 589 595, 620, 666, 677, 687 |
| Manetham, Dechrit | 503 |
| Manongga, Danny | 355, 360, 366 |
| Manurung, Asrar Aspia | 471 |
| Marcelino, Dandy | 266, 626 |
| Marcheta, Noorlela | 554 |
| Marianti, Tatik | 284 |
| Mariyanti, Tatik | 102 |
| Marzuki Shofi, Imam | 378 |
| Masruroh, Siti Ummi | 11, 324, 378, 391, 414, 559, 701 835, 840 |
| Maswani, Maswani | 806, 829 |
| Matin, Iik Muhamad Malik | 633 |
| Maulana, Sabda | 360, 543 |
| Maungmeesri, Benchalak | 451, 457, 498, 595, 677 |
| Maylawati, Dian Sa'Adillah | 107, 130, 204, 372 |
| Meenorngwar, Chai | 722 |
| Mertayasa, I Komang | 28 |
| Meyliana, Meyliana | 290 |
| Mintarsih, Fitri | 408 |
| Muangmeesri, Benchalak | 503 |
| Muhamad Malik Matin, Iik | 96 |
| Muhammad, Muhammad | 118 |
| Muktabar, Rafi Nabil | 811 |
| Muliyah, Evi | 733 |
| Muqorrrir Kaffah, Faiz | 783, 789 |
| Muslimin, Jm | 385 |
| Musyarofah, Umi | 396 |
| Muzayyanah, Fenty Eka | 136 |
| | |
| N, Nuraeni | 272 |
| Najma Iftitah, Khofifa | 256 |
| Nalawati, Rizki Elisa | 744 |
| Nanang, Herlino | 11, 378, 408 |
| Nashshar, Muhammad Dzaky | 744 |
| Nasution, Marah Doly | 471 |
| Naufal Zulfikar, Muhamad | 256 |
| Naufal, Fadhli | 46 |
| Nazilah, Hikmatun | 170 |
| Ngafidin, Khairun Nisa Meiah | 772 |
| Nithikathkulb, Choosak | 722 |
| Nooyimsai, Saranpong | 766 |

| | |
|-------------------------------|-----------------------------|
| Nuansa Refardi, Getar | 817 |
| Nugroho, Okvi | 187 |
| Nur Maulana, Fahmi | 96 |
| Nurbojatmiko, Nurbojatmiko | 463 |
| Nurenie, Alexander | 296 |
| Nurhayati, Nurhayati | 408, 716 |
| Nurjannah, Wilda | 671, 716 |
| Nurlaela, Lela | 349 |
| Nurlatifah, Eva | 107 |
| Nurmiati, Evy | 341, 638, 783, 823 |
| Nuryasin, Nuryasin | 146, 152, 492, 823 |
| Nusantoro, Hardjanto | 166 |
| Nyoman Crisnapati, Padma | 509, 577 |
| Octoyuda, Edgar | 519 |
| Oganda, Fitra Putri | 56, 330 |
| Oktarini, Safira | 210 |
| Oktaviana R, Shinta | 739 |
| Padeli, Padeli | 64 |
| Pamungkas, Muhammad Sigit Tri | 420 |
| Parikesit, Elang | 571, 666 |
| Permatasari, Reisa | 170 |
| Pitchay, Anwar Allah | 614 |
| Prabowo, Harjanto | 290 |
| Prasetyo, Juli Adi | 492 |
| Prayoga, Bagas Yana | 682 |
| Prayudani, Santi | 82 |
| Pujiastuti, Lise | 245, 251 |
| Purnomo, Hindriyanto Dwi | 75, 302, 360 |
| Pusparini, Nur Nawaningtyas | 113 |
| Putra Seno, Bayu Ajie | 28 |
| Putra, Syopiansyah Jaya | 463, 682, 728 |
| Putri Utami, Devika | 783 |
| Putri, Ananda Alifia | 75, 175 |
| Putri, Kirana Humaira | 840 |
| Putri, Mitha Rachma | 324 |
| Putri, Rizka Amalia | 701, 835 |
| Putri, Salsabila Tahta Hirani | 481 |
| Rabgyal, Tenzin | 486, 571, 620, 677 |
| Rahajeng, Elsy | 118, 224 |
| Rahardja, Reymund | 87 |
| Rahardja, Untung | 33, 245, 251, 302, 360, 366 |
| Raharjo, Mugi | 245 |
| Rahiem, Maila | 733 |
| Rahma Inayatullah, Anggita | 554 |
| Rahman, Alfi | 278 |

| | |
|-------------------------------|-------------------------|
| Rahmani, Dita Aprillia | 230 |
| Rahmania Az Zahra, Achani | 102 |
| Ramadan, Ahmad | 69 |
| Ramadhan, Ahmad Fadlan | 701 |
| Ramadhan, Arief | 290, 296 |
| Ramadhane, Titisari | 235 |
| Ramadhona, Nova | 547 |
| Ramdania, Diena Rauda | 107, 210 |
| Ramdhani, Muhammad Ali | 107, 130 |
| Ramlan, Fitria Wulandari | 240 |
| Ratnawati, Suci | 141, 224, 492, 811, 823 |
| Rawat, Bhupesh | 166, 314, 330 |
| Riana, Dwiza | 739 |
| Riani Frisilia, Puti | 215 |
| Riskaputra, Raffyanda | 414 |
| Riyanti Hanifah, Salma | 341 |
| Riza Chakim, Mochamad Heru | 64 |
| Riza, Ferdy | 240 |
| Rizki, Irfan Nur | 444 |
| Rokhim, Muhammad Noor | 463 |
| Romadhon, Dzikri Rahmat | 733 |
| Rosadi Djarkasih, Ahmad | 525 |
| Rosalina, Mira | 554 |
| Rosdiana, Rosdiana | 69 |
| Rosyada, Dede | 806, 835 |
| Rosyadi, Tabah | 378, 401 |
| Rozy, Nurul Faizah | 396, 401, 420, 835 |
| Rungcharoen, Samart | 595 |
| Rusilowati, Umi | 543 |
| S, Usanto | 349 |
| Saepudin, Didin | 806 |
| Safitra, Muhammad Fakhrol | 235 |
| Safitri, Habibi Ramdani | 187 |
| Saidah, Musfiah | 46 |
| Samiaji, Muhammad | 378 |
| Samudera, Dizar Wangsa | 682 |
| Sani, Asrul | 113 |
| Santoso, Nesti Anggraini | 314, 366 |
| Santoso, Nuke Puji Lestari | 175, 543 |
| Santoso, Sugeng | 28 |
| Santoso, William | 671 |
| Sari, Indah Purnama | 471 |
| Sari, Meri Mayang | 754 |
| Sary, Yoshida | 240 |
| Sasmoko, Sasmoko | 691 |
| Sastika, Widya | 626 |
| Satria Wijaya, I Gusti Ngurah | 525 |

| | |
|---------------------------|--------------------|
| Sawraja, Ahmad Arya | 835 |
| Sediyono, Eko | 366, 432 |
| Sembiring, Irwan | 302, 355, 360, 366 |
| Setiadi, Ade | 349 |
| Setianingrum, Anif Hanifa | 414, 661 |
| Setiawan, Adi | 355 |
| Setiono, Dede Puji | 22 |
| Setyawan, Bayu Aji | 136 |
| Setyawan, Iwan | 360, 432 |
| Shaliha, Rahma Maulida | 744 |
| Shofi, Imam Marzuki | 760, 840 |
| Sholihah, Mar'Atus | 789 |
| Sibarani, Blasius Erik | 33 |
| Siswanto, Joko | 302 |
| Smuthkalin, Chanokporn | 457 |
| Soetikno, Johnny | 260 |
| Soleman, Muhammad Dede | 166 |
| Sopandi, Ajang | 783, 789 |
| Srichaipanya, Wichian | 514, 577 |
| Sriliasta Bangun, Cicilia | 28 |
| Suakanto, Sinung | 235 |
| Subchi, Imam | 835 |
| Subhan Riza, Bob | 69 |
| Subiyakto, Aang | 783, 789 |
| Sudaryono, Sudaryono | 87 |
| Sugiarti, Yuni | 256, 341, 682 |
| Sugiarto, Sugiarto | 525 |
| Suhanda, Yogasetya | 349 |
| Suhartono, Joni | 614 |
| Sukket, Sasiwimol | 583, 589, 620 |
| Sukmana, Husni Teja | 11, 414, 425 |
| Sumanto, Sumanto | 341 |
| Sunardi, Nardi | 749, 754 |
| Sunarjo, Richard Andre | 56, 64 |
| Sunarya, Po Abas | 39, 314 |
| Suniantara, I Ketut Putu | 525 |
| Suorsa, Mikko | 6 |
| Suparto, Suparto | 829 |
| Supriadi, Ajay | 349 |
| Supriyono, Ignatius Agus | 432 |
| Surono, Galih | 113 |
| Surono, Surono | 69 |
| Suryani, Erma | 806 |
| Susanto, Aries | 146, 152 |
| Susilo, Budi | 260 |
| Sutam, Borwornyot | 577 |
| Sutarman, Asep | 749, 754 |
| Sutyasadi, Petrus | 589, 666, 687 |

| | |
|--------------------------------|-------------------------|
| Syam Harira, Kevin | 181 |
| Syaripudin, Undang | 372 |
| Syukron, Fildzah Waalidein | 425 |
| Tabah Rosyadi, Muhammad | 801 |
| Tangjai, Chanida | 451 |
| Tarmizi, Rasyid | 314 |
| Taufik Muharram, Asep | 633 |
| Taufik, Ichsan | 130, 170 |
| Thaloy, Jarinya | 766 |
| Thar, Kaung Soe | 486 |
| Thavitchasri, Phummarin | 677 |
| Thaweechart, Sirintorn | 457 |
| Tholabi, Ahmad | 835 |
| Thwe, Yamin | 193, 199, 438, 509, 766 |
| Timotius, Ivanna K. | 432 |
| Triandini, Evi | 193, 199, 525 |
| Trisetyarso, Agung | 296 |
| Uriawan, Wisnu | 210, 372 |
| Utamajaya, Joy Nashar | 290 |
| Utami, Meinarini Catur | 141, 806 |
| Utami, Tania Syifa | 704 |
| Uyun, Shofwatul | 308 |
| Viktor A Sin, Muhamad | 87 |
| W.Haryanto, Jason | 159 |
| Wafiqni, Nafia | 760 |
| Wahana, Agung | 107 |
| Wahyudi, Mochamad | 87, 245, 251 |
| Wahyufebrian, Alda | 823 |
| Wali, Muhammad | 56 |
| Wardhani, Luh Kesuma | 531, 710 |
| Warsuta, Bambang | 633 |
| Waspodo, Bayu | 444 |
| Wicaksono, Martinus Bagus | 687 |
| Widiasari, Indrastanti Ratna | 355 |
| Wijaya, I Made Pasek Pradnyana | 608 |
| Wijayanto, Sena | 16 |
| Wiranata, Ade Davy | 113 |
| Wirya, Muhammad Adi | 481 |
| Wiryawan, Drajad | 614 |
| Wuisan, Dewi Sri Surya | 159 |
| Wulandari, Astri | 266 |
| Wulandari, Riza | 525 |
| Wulansari, Nurbaini Futuhat | 733 |

| | |
|----------------------------|----------|
| Yadila, Ahmad Bayu | 330 |
| Yuliani, I Dewa Ayu Eka | 260 |
| Yuniarti, Elvan | 481 |
| Yuniarto, Dwi | 783, 789 |
| Yusadara, I Gede Putra Mas | 608 |
| Yusril, Azizah Nurfauziah | 728 |
| Yusuf, Maulana | 39, 159 |
| | |
| Zaafira, Reyhan Diva | 559 |
| Zaharuddin, Zaharuddin | 175 |
| Zahra, Irene Avillya | 28 |
| Zakaria, Noor Azura | 823 |
| Zakiyyah, Humaira | 537 |
| Zamhari, Arif | 811 |
| Zarlis, Muhammad | 296 |
| Zein, Awiez Fathwa | 531 |
| Zulfa, Siti | 656 |
| Zulfiandri, Zulfiandri | 638, 716 |
| Zulhi, Muhammad Hairid | 175 |
| Zulkifli, Dhea Urfina | 272 |
| Zulkifli, Zulkifli | 272, 817 |

Table of Contents

| | |
|--|----|
| Online Compulsive Buying Behavior after Outbreak in Java – Big Cities..... | 1 |
| <i>Sevenpri Candra, Christian Christian and Leoni Rizki Adlinma</i> | |
| Information Security Failures Measured and ISO/IEC 27001:2022 Controls Ranked by GDPR Penalty Analysis..... | 6 |
| <i>Mikko Suorsa and Petri Helo</i> | |
| The Success of Higher Education Institutional Policy Is Determined by IT Leadership and IT Infrastructure | 11 |
| <i>Herlino Nanang, Husni Teja Sukmana, Yusuf Durachman, Viva Arifin, Dewi Khairani and Siti Ummi Masruroh</i> | |
| Deep Learning-Based Disaster Sentiment Analysis of Unbalanced Twitter Data: The Case of Indonesia Earthquake | 16 |
| <i>Rona Nisa Sofia Amriza and Sena Wijayanto</i> | |
| Examining the Determinants of Open Government Data Adoption: An Indonesian Case .. | 22 |
| <i>Dede Puji Setiono, Evaewero French and Abdul Ilman</i> | |
| An Analytic Study of Learning Management System in Higher Education | 28 |
| <i>Cicilia Sriliasta Bangun, Harmaini Harmaini, Sugeng Santoso, Chandra Lukita, I Komang Mertayasa, Irene Avillya Zahra and Bayu Ajie Putra Seno</i> | |
| Digital Ringgit: A New Digital Currency with Traditional Attributes..... | 33 |
| <i>Nur Azman Abu, Zulkarnain Kedah, Untung Rahardja, Blasius Erik Sibarani, Sandy Kosasi, Susanti Dewi and Ihya Syihabul Fadli</i> | |
| Renewable Energy Transition Towards Sustainable Development: Benefits, Constraints, and Policy Guidance | 39 |
| <i>Ardi Ardi, Imam Ma'Ruf, David Arayoga Saka, Nuke Puji Lestari Santoso, Maulana Yusuf, Po Abas Sunarya and Ida Faridah</i> | |
| Technology Adaptation for ShopeeFood's Digital Transformation Empowers Driver Partners in Bogor City | 46 |
| <i>Musfiah Saidah and Fadhli Naufal</i> | |
| Systematic Literature Review: User Acceptance Analysis of Digital Banking Applications. | 51 |
| <i>Hofifah Isma Adauwiyah, Yusuf Durachman and Muhamad Nur Gunawan</i> | |
| Digital Transformation in Reading Behavior A Business Model Canvas Approach for Marketing E-Books Library | 56 |
| <i>Chandra Lukita, Muhammad Wali, Richard Andre Sunarjo, Eka Purnama Harahap, Fitra Putri Oganda and Nimatul Khojfah</i> | |
| Implementation of Goods Loss Prevention Tools Using Electronic Article Surveillance (EAS) | 64 |
| <i>Mochamad Heru Riza Chakim, Padeli Padeli, Richard Andre Sunarjo, Lisma Nur Azizah, Yulia Putri Ayu Sanjaya and Marviola Hardini</i> | |
| Covid-19 Systematic Overview Decentralization Using Blockchain Technology | 69 |
| <i>Surono Surono, Bob Subhan Riza, Andri Ma'Mun, Ahmad Ramadan, Rosdiana Rosdiana and Natasya Aprila Yusuf</i> | |

| | |
|--|-----|
| CCTV Camera With Intelligence Technology to Minimize Chicken Mortality Due to Hazardous Gas | 75 |
| <i>Mukti Budiarto, Hindriyanto Dwi Purnomo, Budhi Kristianto, Henderi Henderi, Sedy Zul Friandi and Ananda Alifia Putri</i> | |
| Comparison Between Bi-Directional LSTM And Transfer Learning in Correcting Typing Errors on Twitter Social Media Posts | 82 |
| <i>Arif Lubis, Santi Prayudani and Muhammad Luthfi Hamzah</i> | |
| Developing Instruments for Digital Talent Competence Using Partial Least Square-Based Models | 87 |
| <i>Mochamad Wahyudi, Mochamad Heru Riza Chakim, Henderi Henderi, Sudaryono Sudaryono, Dimas Bagus Saputra, Muhamad Viktor A Sin and Reymund Rahardja</i> | |
| Comparison of Single Exponential Smoothing And Holt-Winter Exponential Smoothing Methods in Sales Commercial Business | 96 |
| <i>Arini Arini, Fahmi Nur Maulana, Hendra Bayu Suseno and Iik Muhamad Malik Matin</i> | |
| Microfinance Management Strategy Using Poverty Reduction Technology | 102 |
| <i>Raden Heriyanto, Tatik Mariyanti and Achani Rahmania Az Zahra</i> | |
| Analysis of Changes in Sentiment towards COVID-19 Vaccination in Indonesia Using the Convolutional Neural Network | 107 |
| <i>Dian Sa'Adillah Maylawati, Muhammad Thariq Sabiq Bilhaq, Agung Wahana, Diena Rauda Ramdania, Eva Nurlatifah and Muhammad Ali Ramdhani</i> | |
| QR Mobile Payment Adoption Using UTAUT Model Development | 113 |
| <i>Asrul Sani, Galih Surono, Nur Nawaningtyas Pusparini, Merliani Ivone, Ade Davy Wiranata and Tri Haryanto</i> | |
| Analyze and Measure Website Quality Using WebQual 4.0, Importance Performance Analysis Methods and GTMetrix | 118 |
| <i>Nia Kumaladewi, Muhammad Muhammad, Elsy Rahajeng and Basyir Arif</i> | |
| WebQual 4.0 Plus: An Approach to Measure Customer Satisfaction toward Website Quality | 124 |
| <i>Qurrotul Aini, Elvi Fetrina and Nadila Chataliya Epriani</i> | |
| Convolutional Neural Network Algorithm for Yoga Pose Estimation System as an Exercise Assistant | 130 |
| <i>Dian Sa'Adillah Maylawati, Difa Andika, Cecep Nurul Alam, Jumadi Jumadi, Ichsan Taufik and Muhammad Ali Ramdhani</i> | |
| Multilabel Sentiment Analysis of Hate Speech Using the Combination of IndoBERT Lite and Bidirectional LSTM-CNN Methods with Grid Search Hyperparameter Optimization .. | 136 |
| <i>Khodijah Hulliyah, Fenty Eka Muzayyanah and Bayu Aji Setyawan</i> | |
| Analysis of the Successful Implementation of The PeduliLindungi Application Using the Delone & McLean Model | 141 |
| <i>Meinarini Catur Utami, Suci Ratnawati and Fifi Alfisa Fitri</i> | |
| Comparative Analysis of Key Management Service Performance on AWS, Google Cloud, and Oracle Cloud with Load Testing, Stress Testing, and Benchmark Testing | 146 |
| <i>Aries Susanto, Ahnaf Hadi Fathulloh, Nuryasin Nuryasin and Aida Fitriyani</i> | |

| | |
|--|-----|
| Systematic Literature Review: Key Management Service For Securing Encryption Key ... | 152 |
| <i>Aries Susanto, Ahnaf Hadi Fathulloh, Nuryasin Nuryasin and Aida Fitriyani</i> | |
| Exploring User Behavior of mHealth Application: A Study of Determinants of Continuanance Usage Intention | 159 |
| <i>Jason W.Haryanto, Ardi Ardi, Dewi Sri Surya Wuisan, Chandra Lukita and Maulana Yusuf</i> | |
| Impact of Massive Tourist and Vehicles Flow on Air and Water Quality of Uttarakhand .. | 166 |
| <i>Bhupesh Rawat, Ankur Singh Bist, Muhammad Dede Soleman, Hardjanto Nusantoro, Po Abas Sunarya and Iqbal Desam Girinzio</i> | |
| Identification of Plant Types Based on Leaf Image Using Convolutional Neural Network (CNN) | 170 |
| <i>Ichsan Taufik, Hikmatun Nazilah, Nur Lukman, Yana Aditia Gerhana, Jumadi Jumadi and Reisa Permatasari</i> | |
| Enhancing User Satisfaction with iLearning Education: An Application of the TAM Model..... | 175 |
| <i>Chandra Lukita, Qurotul Aini, Kristoko Dwi Hartomo, Muhammad Hairid Zulhi, Nuke Puji Lestari Santoso, Ananda Alifia Putri and Zaharuddin Zaharuddin</i> | |
| Extraction Features Using Lexicon Embedding On Convolutional Neural Network For Fake Review Detection | 181 |
| <i>Arini Arini, Kevin Syam Harira and Yusuf Durachman</i> | |
| Implementation of Preprocessing in Text Summarization Techniques for Indonesian Language Documents Using the Flax T5 Approach..... | 187 |
| <i>Arif Ridho Lubis, Habibi Ramdani Safitri, Irvan Irvan, Muharman Lubis, Al-Khowarizmi Al-Khowarizmi and Okvi Nugroho</i> | |
| REMAS: Real-Time Emergency and Monitoring Alert System for Baby Incubator using IoT | 193 |
| <i>I Komang Agus Ady Aryanto, Dechrit Maneetham, Yamin Thwe and Evi Triandini</i> | |
| IoT based PID Closed Loop Control System for Baby Incubators | 199 |
| <i>I Komang Agus Ady Aryanto, Dechrit Maneetham, Yamin Thwe and Evi Triandini</i> | |
| Mood of Song Detection Using Mel Frequency Cepstral Coefficient and Convolutional Neural Network with Tuning Hyperparameter | 204 |
| <i>Wildan Budiawan Zulfikar, Yana Aditia Gerhana, Aulia Yasmin Putri Almi, Dian Sa'Adillah Maylawati and Muhammad Insan Al Amin</i> | |
| Authenticity Detection for Mechanical Watch Using Hidden Markov Model | 210 |
| <i>Aldy Rialdy Atmadja, Safira Oktarini, Diena Rauda Ramdania, Wisnu Uriawan and Yana Aditia Gerhana</i> | |
| User Acceptance Analysis of Online Food Delivery Service Application Using The UTAUT 2 Modification Model | 215 |
| <i>Nur Aeni Hidayah, Eva Khudzaeva and Puti Riani Frisilia</i> | |
| The Influence of Delayed-hit on Caching Servers Utilizing Conventional Cache Replacement Methods..... | 220 |
| <i>Feri Fahrianto and Noriaki Kamiyama</i> | |

| | |
|---|-----|
| User Satisfaction Analysis of Telecommunication Customer Service Mobile Applications Using the End User Computing Satisfaction (EUCS) Method..... | 224 |
| <i>Suci Ratnawati, Elsy Rahajeng and Ridho Dhafi Fauzan</i> | |
| The Role of Social Media in Knowledge Management: A Comprehensive Literature Review..... | 230 |
| <i>Shafira Fatimah Azzahra, Dita Aprillia Rahmani, Tika Astriani, Muharman Lubis and Rosad Ma'Ali El Hadi</i> | |
| Stakeholder Management and Communication Management Plan on E-Government Project | 235 |
| <i>Shafira Fatimah Azzahra, Titisari Ramadhane, Muhammad Fakhrol Safitra, Muharman Lubis and Sinung Suakanto</i> | |
| Crude Palm Oil Price Forecasting Based on ECoS-MARS: in Data Science Models | 240 |
| <i>Al-Khowarizmi Al-Khowarizmi, Fitria Wulandari Ramlan, Syahril Efendi, Arif Ridho Lubis, Ferdy Riza, Amrullah Amrullah and Yoshida Sary</i> | |
| Gender Recognition Based on Face Image Using Deep Learning Method | 245 |
| <i>Mochamad Wahyudi, Waeisul Bismi, Firmansyah Firmansyah, Muqi Raharjo, Untung Rahardja and Lise Pujiastuti</i> | |
| Performance Analysis of Open Shortest Path First Multiarea Using Virtual Link Method . | 251 |
| <i>Mochamad Wahyudi, Firmansyah Firmansyah, Tommi Alfian Armawan Sandi, Waeisul Bismi, Untung Rahardja and Lise Pujiastuti</i> | |
| Component Level Design in Learning-Based Video Games | 256 |
| <i>Yuni Sugiarti, Muhamad Naufal Zulfikar, Nazla Khalisha, E. Oos M Anwas, Khofifa Najma Iftitah and Anggraeni Dian Permatasari</i> | |
| Impacts of IT Governance Mechanisms on Organizational Agility | 260 |
| <i>Sandy Kosasi, Johnny Soetikno, Susanty Margaretha Kuway, I Dewa Ayu Eka Yuliani, Utin Kasma and Budi Susilo</i> | |
| The Impact of Electronic Word of Mouth on Willingness to Promote the Online Travel Services | 266 |
| <i>Dandy Marcelino, Istiharini Istiharini and Astri Wulandari</i> | |
| Analyzing the Phenomenon of Information and Communication Technology on Online Religious Engagement Among Indonesian Muslim Adolescents | 272 |
| <i>Zulkifli Zulkifli, Muhamad Fahri, Nuraeni N and Dhea Urfina Zulkifli</i> | |
| Strategic Analysis of Green Marketing and Brand Image Towards Purchase Decision Consumer Coffee Shop During Pandemic Covid-19 | 278 |
| <i>Muhamad Aras and Alfi Rahman</i> | |
| Impact of Earning Zakat Based on Blockchain Technology on Community Welfare | 284 |
| <i>Muhammad Kamil Husain, Tatik Marianti and Muhamad Lutfi Huzairah</i> | |
| Concept, Technology, Barriers to Smart Village: A Systematic Literature Review | 290 |
| <i>Joy Nashar Utamajaya, Meyliana Meyliana, Harjanto Prabowo, Achmad Nizar Hidayanto and Arief Ramadhan</i> | |

| | |
|---|-----|
| Server Cloud Based Security Surveillance Systems: a Design Science Research | 296 |
| <i>Alexander Nurenie, Arief Ramadhan, Edi Abdurachman, Agung Trisetjarso and Muhammad Zarlis</i> | |
| Number of Road Accidents Predicting Using Deep Learning-Based LSTM Development Models | 302 |
| <i>Joko Siswanto, Hendry Hendry, Untung Rahardja, Irwan Sembiring, Kristoko Dwi Hartomo, Hindriyanto Dwi Purnomo and Ade Iriani</i> | |
| Hybrid Convolutional Neural Network and Support Vector Machine Based on Model Optimization for Skin Cancer Classification | 308 |
| <i>Qorry Aina Fitroh and Shofwatul Uyun</i> | |
| Unveiling Happiness Disparities: A Machine Learning Approach to City-Village Comparison | 314 |
| <i>Bhupesh Rawat, Ankur Singh Bist, Po Abas Sunarya, Marviola Hardini, Nesti Anggraini Santoso and Rasyid Tarmizi</i> | |
| Development of Case Base Reasoning Recommendation and Sound and Lighting Rental System | 319 |
| <i>Calandra Alencia Haryani, Bryan Liming, Andree E. Widjaja and Hery Hery</i> | |
| Sentiment Analysis of Citizen on Twitter in Accessibility of Disabilities at The Public Space Using Support Vector Machine (SVM) Method with Radial Basis Function (RBF) Kernel | 324 |
| <i>Siti Ummi Masruroh, Mitha Rachma Putri, Khodijah Hulliyah, Andrew Fiade, Saepul Aripriyanto and Ahmad Tholabi Kharlie</i> | |
| Proposing a Novel Framework for Prediction of Stock using Machine Learning | 330 |
| <i>Ankur Singh Bist, Bhupesh Rawat, Sandy Kosasi, Qurotul Aini, Fitra Putri Oganda and Ahmad Bayu Yadila</i> | |
| Improving Universal Rendering Performance on NuxtJS-based Web Application | 335 |
| <i>Harta Angkasa, Darren Farell, Erik Hendrawan Putra Wijaya, Said Achmad and Devi Fitriannah</i> | |
| Usability Evaluation on Website Using the Cognitive Walkthrough Method | 341 |
| <i>Yuni Sugiarti, Salma Riyanti Hanifah, E. Oos M. Anwas, Sumanto Sumanto, Saipul Anwar, Anggraeni Dian Permatasari and Evy Nurmiati</i> | |
| Data Mining to Predict the Ability of Prospective Customer Credit Payments | 349 |
| <i>Fifit Alfiah, Usanto S, Ade Setiadi, Ajay Supriadi, Yogasetya Suhanda and Lela Nurlaela</i> | |
| XOR Encryption based on Index Value Enumeration used in Iot based Healthcare | 355 |
| <i>Dendy Jonas, Irwan Sembiring, Adi Setiawan, Danny Manongga, Indrastanti Ratna Wideasari and Dwi Julianingsih</i> | |
| The Effect of Perceived Costs on Blockchain Adoption Intention: an Empirical Study | 360 |
| <i>Qurotul Aini, Hindriyanto Dwi Purnomo, Iwan Setyawan, Danny Manongga, Hendry, Untung Rahardja, Irwan Sembiring and Sabda Maulana</i> | |
| Relationship Quality Analysis using Technology in the Business Sector | 366 |
| <i>Qurotul Aini, Eko Sedyono, Kristoko Dwi Hartomo, Danny Manongga, Untung Rahardja, Irwan Sembiring and Nesti Anggraini Santoso</i> | |

| | |
|---|-----|
| Steganography of Least Significant Bit Algorithm and Combination of Cryptography Vigenère Cipher with Rivest Code 4 for Email Message Security | 372 |
| <i>Yana Aditia Gerhana, Aan Adrian Khothibuhumam, Ichsan Budiman, Wisnu Uriawan, Dian Sa'Adillah Maylawati and Undang Syaripudin</i> | |
| Mobile Health Application Design: A User-Centered Approach for Pulmonary Tuberculosis Screening | 378 |
| <i>Muhammad Samiaji, Siti Ummi Masruroh, Dewi Khairani, Herlino Nanang, Tabah Rosyadi and Imam Marzuki Shofi</i> | |
| Analyzing Radicalism-Related Conversation Patterns on Twitter: A Comparative Study of Association Rules with Apriori and FP-Growth Algorithms | 385 |
| <i>Iva Alfianti, Dewi Khairani, Khodijah Hulliyah, Jm Muslimin, Feri Fahrianto and Nunung Isnaini Dwi Ningsih</i> | |
| Comparing GraphQL and ReST Architecture in Arabic Learning Games: A Quality of Service (QoS) Approach | 391 |
| <i>Muhammad Arya Dhika, Dewi Khairani, Siti Ummi Masruroh, Andrew Fiade, Viva Arifin and Waki Ats Tsaqofi</i> | |
| Enhancing User Experience in "Haji Pintar" Mobile App: Implementing Human Interface Guidelines through UCD and PACMAD | 396 |
| <i>Atmina Jovanka Azzahra, Dewi Khairani, Nurul Faizah Rozy, Nenny Anggraini, Khodijah Hulliyah and Umi Musyarofah</i> | |
| User-Centered User Interface Design for Educational Game: Letter and Number Recognition for Slow Learners | 401 |
| <i>Farrah Anggiaputri, Dewi Khairani, Fenty Eka Muzayyana Agustin, Saepul Aripiyanto, Nurul Faizah Rozy and Tabah Rosyadi</i> | |
| Evaluating Usability: Heuristic Analysis of JKN (Indonesia National Health Insurance) Mobile App User Interface | 408 |
| <i>Rafif Zaki Fattahaq, Dewi Khairani, Fitri Mintarsih, Herlino Nanang, Nurhayati Nurhayati and Iwan Aminudin</i> | |
| Optimizing Product Distribution Service Prices: A Fuzzy Mamdani Logic Implementation Case Study at RnD Enterprises Marketing Consultant Office | 414 |
| <i>Raffyanda Riskaputra, Siti Ummi Masruroh, Dewi Khairani, Victor Amrizal, Anif Hanifa Setianingrum and Husni Teja Sukmana</i> | |
| Performance Optimization Of Naïve Bayes Algorithm For Malware Detection On Android Operating Systems With Particle Swarm Optimization | 420 |
| <i>Nenny Anggraini, Muhammad Sigit Tri Pamungkas and Nurul Faizah Rozy</i> | |
| Exploring User Experience in Mobile Applications: A Systematic Literature Review | 425 |
| <i>Fildzah Waalidein Syukron, Husni Teja Sukmana, Dewi Khairani, Muhammad Azhari, Andrew Fiade and Saepul Aripiyanto</i> | |
| Green Energy Harvest Monitoring of Watering System for Smart Farming Using IoT | 432 |
| <i>Ignatius Agus Supriyono, Eko Sedyono, Iwan Setyawan, Ivanna K. Timotius and Muchlishina Madani</i> | |

| | |
|--|-----|
| Thailand Carbon Dioxide Emissions Forecasting Using Stacked LSTM-based Prediction Model..... | 438 |
| <i>Yamin Thwe, Dechrit Maneetham, Padma Nyoman Crisnapati and Myo Min Aung</i> | |
| Business Sub-Process Analysis and Redesign of Counseling Week (Pekan Konseling) at Career Center Services using Business Process Improvement (BPI) | 444 |
| <i>Bayu Waspodo and Irfan Nur Rizki</i> | |
| Solar Powered RT-Bot: River Trash Collecting Robot | 451 |
| <i>Chanida Tangjai, Benchalak Maungmeesri and Dechrit Maneetham</i> | |
| Automatic Buffalo Feeding and Monitoring System Using NodeMCU ESP8266 based on Internet of Things..... | 457 |
| <i>Sirintorn Thawechart, Benchalak Maungmeesri, Chanokporn Smuthkalin and Dechrit Maneetham</i> | |
| Analysis Of Continuance Use Intention In BNI Mobile Banking Using The Expectation-Confirmation Model (ECM) | 463 |
| <i>Nurbojatmiko Nurbojatmiko, Eva Khudzaeva, Syopiansyah Jaya Putra, Yusuf Durachman and Muhammad Noor Rokhim</i> | |
| Implementation of Fuzzy K-Nearest Neighbor Method in Dengue Disease Classification ... | 471 |
| <i>Asrar Aspia Manurung, Marah Doly Nasution, Al-Khowarizmi Al-Khowarizmi and Indah Purnama Sari</i> | |
| Evaluation of User Satisfaction with Mobile-Based E-Wallet Platforms Using the Delone & Mclean Model (Case Study: Sakuku) | 475 |
| <i>Muhammad Dizza Aliefa Rachman, Yusuf Durachman and Eva Khudzaeva</i> | |
| Detection of Alzheimer’s Disease in Magnetic Resonance Imaging Images Using Machine Learning with the Convolutional Neural Network Method | 481 |
| <i>Ambran Hartono, Elvan Yuniarti, Muhammad Adi Wirya and Salsabila Tahta Hirani Putri</i> | |
| Design and Development of the Unicycle Balancing Robot Using Linear Slider | 486 |
| <i>Kaung Soe Thar, Dechrit Maneetham, Myo Min Aung and Tenzin Rabgyal</i> | |
| Mobile Academic Information Systems for Students: Measuring End-User Computing Satisfaction (EUCS) | 492 |
| <i>Muhammad Qomarul Huda, Nuryasin Nuryasin, Juli Adi Prasetyo, Nia Kumaladewi, Suci Ratnawati and Mona Alyami</i> | |
| Development of a PID Controller-Based Portable Seeder Design for Corn Seeds | 498 |
| <i>Somsamai Boonkon, Benchalak Maungmeesri and Dechrit Maneetham</i> | |
| Design and Development of An Automated Mobile Robot for Hospital Care Services..... | 503 |
| <i>Chaiwut Boonhane, Benchalak Muangmeesri and Dechrit Manetham</i> | |
| Enhancing Gimbal Stabilization Using DMP and Kalman Filter: A Low-Cost Approach with MPU6050 Sensor | 509 |
| <i>Padma Nyoman Crisnapati, Dechrit Maneetham, Yamin Thwe and Myo Min Aung</i> | |
| Enhancing Outdoor Warehouse Operations: Design and Development of GPS and Compass-Guided Automatic Vehicles | 514 |
| <i>Singhanart Ketsayom, Dechrit Maneetham, Myo Min Aung and Wichian Srichaipanya</i> | |

| | |
|--|-----|
| Responding to the Digital Transformation: The Implications of Transformational Leadership to Predict MSMEs Learning Agility..... | 519 |
| <i>Chwen-Li Chang, Edgar Octoyuda and Ivon Arisanti</i> | |
| Analysis Adoption of Information Technology Using the UTAUT Method on Poultry Farmers in Indonesia..... | 525 |
| <i>Evi Triandini, I Gusti Ngurah Satria Wijaya, I Ketut Putu Suniantara, Wayan Cahya Ayu Pratami, Riza Wulandari, Sugiarto Sugiarto, Ahmad Rosadi Djarkasih, Agnesia Candra Sulyani and Niken Larasati</i> | |
| Smart Parking System With Background Subtraction Algorithm Using Progressive Web Apps (PWAs) Technology on Raspberry Pi 4..... | 531 |
| <i>Nenny Anggraini, Awiez Fathwa Zein, Luh Kesuma Wardhani and Khair Fadhillah</i> | |
| Enhancing Loan Application Business Process Model with Multi-perspective Process Mining..... | 537 |
| <i>Rizal Broer Bahaweres and Humaira Zakiyyah</i> | |
| Analyzing the Financial Implications of Increasing Renewable Energy Penetration in Indonesia's Power System..... | 543 |
| <i>Umi Rusilowati, Nuke Puji Lestari Santoso, Aulia Azmi, Sabda Maulana and Adam Faturahman</i> | |
| Quantifying the Effects of Renewable Energy Advancement: A Statistical Analysis Method..... | 547 |
| <i>Mochamad Heru Riza Chakim, Qurotul Aini, Ninda Lutfiani, Nova Ramadhona, Ferry Ariyanto and Marviola Hardini</i> | |
| Optimizing Animation of Adolescents learning materials as Moral Education..... | 554 |
| <i>Noorlela Marcheta, Anggita Rahma Inayatullah, Malisa Huzaiifa and Mira Rosalina</i> | |
| Evaluating User Perception of Online Pharmacy Application in Indonesia..... | 559 |
| <i>Rosa Adelina, Annisya Ayu, Reyhan Diva Zaafira and Siti Ummi Masruroh</i> | |
| A Novel Stair-Climbing Robot Controlled Using the Internet of Things..... | 564 |
| <i>Pharan Chawaphan, Dechrit Maneetham, Padma Nyoman Crisnapati and Ren Jean Liou</i> | |
| Design and Development of an IoT Enabled CNC Machine..... | 571 |
| <i>Tawan Katduang, Dechrit Maneetham, Elang Parikesit and Tenzin Rabgyal</i> | |
| The Solar Panels Cleaning Robot Control via IOT..... | 577 |
| <i>Borwornyot Sutam, Dechrit Maneetham, Padma Nyoman Crisnapati and Wichian Srichaipanya</i> | |
| Development of PID Control System for a Smart Leg Splint using Sensor Technology..... | 583 |
| <i>Sasiwimol Sukket, Dechrit Maneetham and Niyom Laoopugsin</i> | |
| Feedback Control System for Angular Position Locking Fork of Forklifts..... | 589 |
| <i>Sillapachai Klinklai, Dechrit Maneetham, Sasiwimol Sukket and Petrus Sutyasadi</i> | |
| Bridging Tradition and Technology: Enabling Thai Temple Bell Beater Control through IoT..... | 595 |
| <i>Samart Rungcharoen, Benchalak Maungmeesri and Dechrit Maneetham</i> | |

| | |
|--|-----|
| Application of Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU) Algorithm in Gold Price Prediction | 602 |
| <i>Ni Putu Juni Rahayu Dewi, Ni Luh Wiwik Sri Rahayu Ginantra, I Wayan Agus Surya Darma and I Gusti Agung Indrawan</i> | |
| Evaluation of Public Health Centers Performance through Sentiment Analysis using LSTM in Bali Province, Indonesia | 608 |
| <i>I Gede Bintang Arya Budaya, I Komang Dharmendra, Dedy Panji Agustino, I Gede Harsemadi, I Made Pasek Pradnyana Wijaya and I Gede Putra Mas Yusadara</i> | |
| Analysis of Factors Influencing the Use of QRIS on Museum Visitors with the Extended TAM Model..... | 614 |
| <i>Drajad Wiryawan, Devyano Luhukay, Joni Suhartono, Anwar Allah Pitchay, Yuwaraj Ganesan and Anderes Gui</i> | |
| Design and Development of Leg Splint Rehabilitation Monitoring System via IoT..... | 620 |
| <i>Sasiwimol Sukket, Dechrit Maneetham and Tenzin Rabgyal</i> | |
| E-Commerce Website Quality: Usability, Information, Service Interaction & Visual Quality on Customer Satisfaction | 626 |
| <i>Widya Sastika, Fanni Husnul Hanifa, Krishna Kusumahadi and Dandy Marcelino</i> | |
| Decision Support System for Government Aid Resipient using SMART Method..... | 633 |
| <i>Asep Taufik Muharram, Rizki Elisa Nalawati, Alifah Fadiyah, Iik Muhamad Malik Matin and Bambang Warsuta</i> | |
| Cross-Industry Standard Process For Data Mining (CRISP-DM) For Discovering Association Rules in Graduate Tracer Study Data of Islamic Higher Education Institution | 638 |
| <i>Ari Lathifah, Zainul Arham, Nidaul Hasanati, Zulfiandri Zulfiandri and Evy Nurmiati</i> | |
| Evaluation Model The Successful Use of Information Technology in Distance Learning at State Islamic Universities (PTKIN)..... | 644 |
| <i>Eva Khudzaeva, Nur Aeni Hidayah and Qurrotul Aini</i> | |
| Reducing Internet Gaming Disorder in Adolescents: Analysis of Gaming-Contingent of Self-Worth, Loneliness and Peer Attachment | 651 |
| <i>Aprily Eka Asri and Rena Latifa</i> | |
| Enhancing English Students' Writing Skills with Technology Tools: A Qualitative Study.. | 656 |
| <i>Ratna Sari Dewi, Didin Nuruddin Hidayat and Siti Zulfa</i> | |
| Speech Recognition of Sundanese Dialect Using Convolutional Neural Network Method with Mel-Spectrogram Feature Extraction | 661 |
| <i>Anif Hanifa Setianingrum, Khodijah Hulliyah and Muhammad Fitroh Amrilla</i> | |
| Control Improvements of an Electromyography-Based Lower Limb Gait Trainer | 666 |
| <i>Elang Parikesit, Dechrit Maneetham and Petrus Sutiyasadi</i> | |
| A Deep Learning Approach to Outbreak Virus Classification: Utilizing Bidirectional GRU on DNA Sequence of SARS-CoV-2, Zika, Ebola, and MERS | 671 |
| <i>William Santoso, Khodijah Hulliyah, Wilda Nurjannah and Anif Hanifa Setianingrum</i> | |

| | |
|---|-----|
| The Automatic Steering Control System for Local Small Tractor by Encoder Tracking System..... | 677 |
| <i>Phummarin Thavitchasri, Dechrit Maneetham, Benchalak Maungmeesri and Tenzin Rabgyal</i> | |
| Analysis of Strengths and Weaknesses of Software Testing Strategies: Systematic Literature Review..... | 682 |
| <i>Syopiansyah Jaya Putra, Yuni Sugiarti, Bagas Yana Prayoga, Dizar Wangsa Samudera and Dewi Khairani</i> | |
| Improvement Control of a Three Axis Articulated Robotic Arm Using PID Cascade Control..... | 687 |
| <i>Petrus Sutiyasadi, Martinus Bagus Wicaksono and Dechrit Maneetham</i> | |
| Improving the Quality of P4AI Mobile Apps through User Interface Results and User Experience Surveys..... | 691 |
| <i>Yasinta Indrianti, Sasmoko Sasmoko, Sonya Rapinta Manalu and Lukas Kurniawan</i> | |
| Relation Classification in Scientific Article Abstracts using SciBERT with Entity Marker . | 696 |
| <i>Nur Inayah, Muhaza Liebenlito, Nina Fitriyati, Muhammad Manaqib and Nabila Aryanti</i> | |
| Implementation of the K-means Clustering Algorithm for Targeting Ads. Case Study: IBM Watson Analytics Car Insurance Customer Data..... | 701 |
| <i>Siti Ummi Masrurroh, Asyifa Tasya Fadilah, Khodijah Hulliyah, Ahmad Fadlan Ramadhan, Rizka Amalia Putri and Mohamad Ali Irfan</i> | |
| Sentiment Analysis on News Headlines of Nation’s Capital Relocation Using CNN and SVM..... | 704 |
| <i>Nidaul Hasanati, Tania Syifa Utami and Rinda Hesti Kusumaningtyas</i> | |
| IoT-based Alcohol Detection Prototype for Public Transportation Drivers..... | 710 |
| <i>Muhamad Haikal Ardiyansah, Luh Kesuma Wardhani and Arini Arini</i> | |
| Enhancing Small Dataset Performance: Data Augmentation and Transfer Learning in Indonesian Traditional Foods Classification..... | 716 |
| <i>Nurhayati Nurhayati, Zulfiandri Zulfiandri, Wilda Nurjannah and Anggita Maharani Gumay Putri Gumay Putri</i> | |
| Predicting Loneliness using SVM, Logistic Regression and Decision Tree in Thailand..... | 722 |
| <i>Chai Meenornngwar and Choosak Nithikathkulb</i> | |
| The Impact of Technological Readiness Factors on User Satisfaction in The Indonesian Local Government Employee Service System..... | 728 |
| <i>Syopiansyah Jaya Putra, Ismail Khalil, Ahmad Cucus and Azizah Nurfauziah Yusril</i> | |
| Enhancing Student Engagement in Computational Physics through Project-Based Learning: An Exploration of VBA Physics Simulation..... | 733 |
| <i>Dzikri Rahmat Romadhon, Maila Rahiem, Ratna Faeruz, Evi Muliyah, Asmui Asmui and Nurbaini Futuhat Wulansari</i> | |
| Evaluating SVOD User Experiences: Insights from the UEQ Method..... | 739 |
| <i>Shinta Oktaviana R, Retno Dwi Wulandari and Dwiza Riana</i> | |

| | |
|--|-----|
| Vehicle Number Plate Recognition in Intelligent Transportation System using YOLO v8 and EasyOCR | 744 |
| <i>Rizki Elisa Nalawati, Dewi Yanti Liliana, Ratna Widya Iswara, Muhammad Dzaky Nashshar, Rumika Damayanti M.S. and Rahma Maulida Shaliha</i> | |
| Exploring the Role of Information Technology in Analyzing the Choice to Attend a Master's Program in Management during COVID-19: A Financial Perspective | 749 |
| <i>Nardi Sunardi, A Kadim, Asep Sutarman, Ilamsyah Ilamsyah and Mustofa Kamal</i> | |
| Leveraging IT for Optimizing Employee Performance via Work Culture and Quality Management in BUMD Enterprises..... | 754 |
| <i>Asep Sutarman, A Kadim, Nardi Sunardi, Meri Mayang Sari and Yusuf Febriansyah</i> | |
| Comparison of the Indobert Optimization Hyperparameter Algorithm for Radicalism Sentiment Analysis..... | 760 |
| <i>Fenty Eka Muzayyana Agustin, Khodijah Hulliyah, Frido Arifadilah, Imam Marzuki Shofi and Nafia Wafiqni</i> | |
| Enhancing Breeding Control: The IoT-Driven Automated System for Budgie Farming | 766 |
| <i>Saranpong Nooyimsai, Jarinya Thaloy, Parinya Jansengrat, Weena Janratchakool, Jaturapith Krohkaew, Padma Nyoman Crisnapati and Yamin Thwe</i> | |
| Evaluation of Human Resource Information System Implementation Success and Technology Trust Factors in the Context of a Manufacturing Company | 772 |
| <i>Sarah Astiti, Khairun Nisa Meiah Ngafidin and Muhammad Mahendra</i> | |
| Improving Digital Literacy of Rural Women Entrepreneurs in Indonesia | 778 |
| <i>Amelia Fauzia and Sri Hidayati</i> | |
| Adopting Five Planes Framework for Developing User Interface based on User Experience Aspects | 783 |
| <i>Aang Subiyakto, Devika Putri Utami, Evy Nurmiati, Dwi Yuniarto, Ajang Sopandi and Faiz Muqorrrir Kaffah</i> | |
| Evaluating Effectiveness and Efficiency of A Website Using Cognitive Walkthrough Method | 789 |
| <i>Tri Haryanto, Mar'Atus Sholihah, Dwi Yuniarto, Ajang Sopandi, Faiz Muqorrrir Kaffah and Aang Subiyakto</i> | |
| Comparative Analysis of Time Series Methods for Stock Market Index Forecasting..... | 795 |
| <i>Elvi Fetrina, Meinarini Catur Utami and Fakhri Arizki</i> | |
| Implementation of LoRaWAN Routing Protocol in Wireless Sensor Network for Smart Compost System with LoRa Communication Module..... | 801 |
| <i>Nenny Anggraini, Syaifan Fadlan Riady Bachri and Muhammad Tabah Rosyadi</i> | |
| The SEM-PLS Analysis for Testing Questionnaire: Software Developer Productivity Based on Religiosity and Work Behavior | 806 |
| <i>Meinarini Catur Utami, Dede Rosyada, Erma Suryani, Nashrul Hakiem, Didin Saepudin and Maswani Maswani</i> | |
| Analysis of Website Quality Using Webqual 4.0 Method and Importance Performance Analysis (IPA) | 811 |
| <i>Suci Ratnawati, Arif Zamhari, Nidaul Hasanati and Rafi Nabil Muktabar</i> | |

| | |
|---|-----|
| Design and Build a Web-Based e-Learning System using ReactJS Framework | 817 |
| <i>Nia Kumaladewi, Getar Nuansa Refardi, Muhamad Nur Gunawan and Zulkifli Zulkifli</i> | |
| Continuance Use Intention Analysis on Paid Streaming Service Using Expectation-Confirmation Model (ECM) | 823 |
| <i>Muhammad Qomarul Huda, Alda Wahyufebrian, Nuryasin Nuryasin, Evy Nurmiati, Noor Azura Zakaria and Suci Ratnawati</i> | |
| Student Perceptions of User Satisfaction and User Loyalty of Website Based E-Learning .. | 829 |
| <i>Nur Aeni Hidayah, Muhamad Nur Gunawan, Dyah Kusumawati, Maswani Maswani, Rizqi Handayani and Suparto Suparto</i> | |
| Decision Support System Mapping of Information Technology Training for Students with Blind Disabilities | 835 |
| <i>Siti Ummi Masrurah, Dede Rosyada, Ahmad Tholabi, Ahmad Arya Sawraja, Nurul Faizah Rozy, Rizka Amalia Putri and Imam Subchi</i> | |
| Development Of A Question Answering Model Using The Indobert Algorithm To Evaluate Website Content In Indonesian Language | 840 |
| <i>Siti Ummi Masrurah, Kirana Humaira Putri, Khodijah Hulliyah, Imam Marzuki Shofi and Victor Amrizal</i> | |

Systematic Literature Review: Key Management Service For Securing Encryption Key

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Abstract—This paper utilizes the Systematic Literature Review (SLR) method to investigate and analyze the key management services employed for securing encryption keys, as well as the benefits of these methods. The research findings support the conclusion that SLR is an effective approach for studying user acceptability of widely explored E-Wallet apps, wireless sensor networks (WSNs), and key generation centers (KGCs). Data regarding the names of encryption keys was collected during the period from 2019 to 2023. Key Management Systems (KMS) are extensively utilized to comprehend and evaluate the factors influencing the Key Management Service for Securing Encryption Key. The analysis focuses on four main topics: the names of encryption keys, methods used for encryption, statistical methods, and the Key Management Service. Comparative analysis emerges as the most commonly employed statistical approach.

Keywords— *Key Management Service, Encryption Key, Systematic Literature Review*

I. INTRODUCTION

In an increasingly digitally connected world, data security is a major concern. One way to protect the confidentiality and integrity of data is by using encryption. Encryption involves converting text or information into a form that cannot be read, except by using the right encryption key. However, strong encryption can only be implemented if encryption key management is done well. Encryption key management involves all aspects related to the generation, storage, distribution, and use of encryption keys used in the process of encrypting and decrypting data. This is where Key Management Service (KMS) plays an important role. KMS is a service specifically designed to manage encryption keys in a secure and efficient manner. The main task of a KMS is to provide facilities to generate, store, change, and distribute encryption keys to authorized users.

One of the main objectives of KMS is to protect encryption keys from security threats. The KMS uses strong methods and algorithms to protect the keys while in storage and while being transferred over the network. This includes the use of advanced encryption techniques, strict access controls, and physical security measures to protect the keys from theft or unauthorized manipulation. In addition, KMS also provides ease of use of encryption keys. The KMS ensures that encryption keys are available when needed and accessed by authorized entities. This includes key lifecycle management, such as key generation, rotation, and destruction in accordance with established security policies. In a business context, KMS is essential for maintaining the confidentiality

and integrity of sensitive data. For example, organizations that store customer data, financial data, or industry confidential data, should implement a KMS to ensure that encryption keys are properly protected and managed.

Overall, Key Management Service (KMS) plays a crucial role in data security through effective encryption key management. By adopting a KMS, organizations can ensure that encryption keys are kept secure, available, and used appropriately. This is an important step in maintaining confidentiality, integrity, and trust in the secure transmission and storage of data in the ever-evolving digital world.

II. METHODOLOGY

The stages in this research refer to research that has been done previously in this Systematic Literature Review (SLR).

A. Object of research

The object of this research is Key Management Service (KMS) for encryption key security. This research was chosen because data security is one of the crucial aspects in an increasingly digitally connected world. In that context, encryption is a commonly used method to protect data confidentiality and integrity. However, strong encryption can only be achieved if encryption key management is done well. KMS is a system or service designed to manage encryption keys in a secure and efficient manner. Encryption keys are key components in the process of encrypting and decrypting data, and are important for maintaining the confidentiality of encrypted data. Therefore, the object of this research is KMS as a solution in effective encryption key management. This research is important because KMS has a crucial role in maintaining the security of sensitive data in various fields, including business, industry, and the public sector. By examining and understanding more about KMS, this research can provide valuable insights in the development of a more robust and efficient information security system. Moreover, with compliance requirements becoming increasingly stringent and changing frequently, research on KMS can also help organizations meet applicable security and compliance standards, such as GDPR, HIPAA, or other financial sector regulations. In the context of this research, the implementation, reliability, efficiency, and security of the KMS can be analyzed to identify strengths, weaknesses, and potential improvements. Thus, research on KMS for encryption key security makes an important contribution to the development of stronger information security systems and better data protection.

B. Research Method

The stages in the Systematic Literature Review consist of 3 stages of research consisting of the planning stage (planning a review), conducting (conducting a review) and reporting review. The research stages can be seen in the following figure:

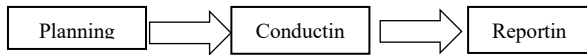


Fig. 1. Research Stages

1) Research Question

A statement of curiosity about a topic that is systematically obtained. The questions used in this research include:

- RQ1: How can KMS overcome the challenges of efficient and scalable encryption key management in complex and large environments?
- RQ2: How can the KMS provide transparency and auditability of encryption key-related activities to support compliance and suspicious activity detection?
- RQ3: How can the KMS address the risk of encryption key loss and provide effective disaster recovery mechanisms to maintain business continuity and data integrity?
- RQ4: How can the KMS address the challenges of facilitating secure collaboration between entities sharing encryption keys, including aspects such as key distribution, setting access rights, and managing security policies?

2) Search process

After formulating the problems and questions that will be used in the research, the next stage is to search for relevant journal papers. The process of searching for journal papers in this study is by accessing the site <https://scholar.google.com>

3) Inclusion and Exclusion Criteria

This step is completed to determine whether or not the data found is feasible to use in SLR research. a feasibility assessment of particular journal articles that will be used as references, such as:

- Journal papers published in 2019-2023.
- Journal papers are obtained from the site <https://scholar.google.com>
- The journal should focus on evaluating user satisfaction key management service for securing encryption key.

4) Quality Assessment

This step is completed to determine whether or not the data found is feasible to use in SLR research. a feasibility assessment of particular journal articles that will be used as references, such as:

- QA1: Are journal papers published in 2019-2023?

- QA2: Does the journal have adequate citations and references from previous research relevant to the topic of evaluating e-wallet application user satisfaction?
- QA3: Does the journal use appropriate and valid research methods to evaluate user satisfaction with e-wallet applications.

5) Data Collection

- Check out the website at scholar.google.com
- Type the search term "evaluation of user satisfaction with e-wallet applications"
- Because the search results have not been filtered, they are still quite wide. To receive the most recent five years of study, enter 2019–2023, then click the search button.

6) Data Analysis

The selected search results will be used to draw conclusions based on descriptions drawn from logical facts that will address the earlier raised queries.

7) Documentation

At this point, the author presents the study findings in a planned manner in a paper that will be published.

III. RESULT AND DISCUSSION

A. Search Process Results and Inclusion and Exclusion Criteria

According to the findings of the search process and inclusion and exclusion criteria, only journal publications pertaining to Key Management Service For Securing Encryption Key were chosen with the criterion of 2019 to 2023. Cryptography Key In addition, as shown in Table I, the journal papers are divided into categories according to the kind of journal.

TABLE I. SEARCHING PROCESS RESULTS

| No. | Journal Type | Year | Amount |
|-----|---|------|--------|
| 1 | IEEE Communications Surveys and Tutorials | 2019 | |
| 2 | IEEE Transactions on Dependable and Secure Computing | 2021 | 2 |
| 3 | IEEE Access | 2019 | 6 |
| 4 | Concurrency and Computation: Practice and Experience | 2019 | |
| 5 | Computer Communications | 2021 | ` |
| 6 | Proceedings of the ACM Conference on Computer and Communications Security | 2019 | 2 |
| 7 | Wireless Personal Communications | 2019 | |
| 8 | Ad Hoc Networks | 2019 | 2 |
| 9 | International Conference on Parallel, Distributed and Grid Computing | 2020 | |
| 10 | IEEE Transactions on Cloud Computing | 2021 | |
| 11 | IEEE Internet of Things Journal | 2019 | |
| 12 | IEEE Transactions on Industrial Informatics | 2020 | |
| 13 | Lecture Notes of the Institute for Computer Sciences, Social- and Informatics | 2019 | |

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| | Telecommunications Engineering, LNICST | | |
| 14 | IOP Conference Series: Materials Science and Engineering | 2019 | |
| 15 | Proceedings of the 14th EuroSys Conference | 2019 | |
| 16 | International Journal of Communication Systems | 2019 | |
| 17 | IEEE Networking Letters | 2019 | |
| 18 | Advances in Engineering Research | 2020 | |
| 19 | IEEE Transactions on Vehicular Technology | 2020 | |
| 20 | Neural Computing and Applications | 2021 | |
| 21 | Optik | 2021 | |
| 22 | Pusion: Practice and Applications | 2021 | |
| 23 | International Journal of Advanced Intelligence Paradigms | 2021 | |
| 24 | Ad Hoc Networks | 2021 | 2 |
| 25 | Neural Processing Letters | 2022 | |
| 26 | Emerging Science Journal | 2021 | |
| 27 | Lecture Notes in Networks and Systems | 2021 | |
| 28 | Multimedia Tools and Applications | 2021 | |
| 29 | IEEE Systems Journal | 2022 | |
| 30 | Optics and Lasers in Engineering | 2021 | |
| 31 | Information Sciences | 2019 | |

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|----|--|------|-----|-----|-----|---|
| | Rodriguez, Ifiok E. Otung | | | | | |
| 8 | Stanislaw Jarecki, Hugo Krawczyk, Jason Resch | 2019 | Yes | Yes | Yes | √ |
| 9 | Y. Harold Robinson · E. Golden Julie | 2019 | Yes | Yes | Yes | √ |
| 10 | Yasmine Harbi a , Zibouda Aliouat a , Allaoua Refoufia , Saad Harous Abdelhak Bentaleb | 2019 | Yes | Yes | Yes | √ |
| 11 | Manoj Kumar Shukla, Ashwani Kumar Dubey, Divya Upadhyay | 2002 | Yes | Yes | Yes | √ |
| 12 | Lei Zhang | 2019 | Yes | Yes | Yes | √ |
| 13 | Warit sirichotedu mrong , Yuma kinoshit | 2019 | Yes | Yes | Yes | √ |
| 14 | Mohammad Wazid, Member, IEEE, Palak Bagga, Ashok Kumar Das | 2019 | Yes | Yes | Yes | √ |
| 15 | Yasmine Harbi , Zibouda Aliouat , Allaoua Refoufia , Saad Harous , Abdelhak Bentaleb | 2019 | Yes | Yes | Yes | √ |
| 16 | Jing Wang, Libing Wu, Kim-Kwang Raymond Choo, Debiao He | 2019 | Yes | Yes | Yes | √ |
| 17 | K. Hamsha(&) and G. S. Nagaraja | 2019 | Yes | Yes | Yes | √ |
| 18 | K. Hamsha(&) and G. S. Nagaraja | 2019 | Yes | Yes | Yes | √ |
| 19 | John S. Koh, Steven M. Bellovin, Jason Nieh | 2019 | Yes | Yes | Yes | √ |
| 20 | Anwar GhaniKhwa ja Mansoor | 2019 | Yes | Yes | Yes | √ |

B. Quality Assessment Results

The results of the Quality Assessment can be seen in Table II.

TABLE II. QUALITY ASSESSMENT RESULTS

| No. | Author | Year | QA1 | QA2 | QA3 | Result |
|-----|--|------|-----|-----|-----|--------|
| 1 | Galinina, Olga Andreev, Sergey | 2020 | Yes | Yes | Yes | √ |
| 2 | Amrita Ghosal & Mauro Conti | 2019 | Yes | Yes | Yes | √ |
| 3 | Xiaokang Hu, Jian Li | 2019 | Yes | Yes | Yes | √ |
| 4 | Marcus De Ree & Georgios Manta | 2019 | Yes | Yes | Yes | √ |
| 5 | R. Velumadha va RaoK. Selvamani l S. Kanimozhi A. Kannan | 2019 | Yes | Yes | Yes | √ |
| 6 | Mingxin Ma, Student Member, IEEE, Guozhen Shi, and Fenghua Li3 | 2019 | Yes | Yes | Yes | √ |
| 7 | Marcus de Ree, Georgios Mantas, Jonathan | 2020 | Yes | Yes | Yes | √ |

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| | Shahid Mehmood Shehzad Ashraf Chaudhry Arif Ur Rahman Malik Najmus Saqib | | | | | |
| 21 | Dagang Li—y, Rong Du—, Yue Fu—, Man Ho Auz | 2019 | Yes | Yes | Yes | √ |
| 22 | Tao Yu | 2021 | Yes | Yes | Yes | √ |
| 23 | Jolfaei, Alireza Kant, Krishna | 2020 | Yes | Yes | Yes | √ |
| 24 | Zhuo Ma, Junwei Zhang, Yongzhen Guo, Yang Liu, Ximeng Liu, Wei | 2020 | Yes | Yes | Yes | √ |
| 25 | Varun Prabhakara n,Ashokku mar Kulandasa my | 2021 | Yes | Yes | Yes | √ |
| 26 | Mahdi Shariatzade h, Mohammad Javad Rostami , Mahdi Eftekhari | 2021 | Yes | Yes | Yes | √ |
| 27 | Shibin David, Andrew , K. Martin Sagayam, Ahmed A. Elngar | 2021 | Yes | Yes | Yes | √ |
| 28 | Kiran Mary Matthew, Abdul Quadir Muhammed and Vijayakuma r Varadarajan | 2019 | Yes | Yes | Yes | √ |
| 29 | Osama A. Kashan a., Rami Ahmad b, Nour M. Khafajah c | 2021 | Yes | Yes | Yes | √ |
| 30 | Guipeng Zhang · Haoran Xie Zhenguo Yang Xiaohui Tao· Wenyin Liu | 2021 | Yes | Yes | Yes | √ |
| 31 | Maitri Patel , Rajan Patel | 2021 | Yes | Yes | Yes | √ |
| 32 | Yuan Zhang, | 2021 | Yes | Yes | Yes | √ |

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|----|--|------|-----|-----|-----|---|
| 33 | Heqing Song , Jifei Li , And Haoteng Li | 2021 | Yes | Yes | Yes | √ |
| 34 | Pradeep Kumar Singh · Sławomir T. Wierzcho'n Sudeep Tanwar · Maria Ganzha · Joel J. P. C. Rodrigues | 2020 | Yes | Yes | Yes | √ |
| 35 | Ruiping Lil | 2019 | Yes | Yes | Yes | √ |
| 36 | Kwame Opuni-Boachie Obour Agyekum , Qi Xia , Emmanuel Boateng Sifah , Christian Nii Aflah Cobblah , Hu Xia , and Jianbin Gao | 2021 | Yes | Yes | Yes | √ |
| 37 | Sui, Liansheng Pang, Zhi Cheng, Ying Cheng, Yin Xiao, Zhaolin | 2021 | Yes | Yes | Yes | √ |
| 38 | Yuling Luo, Xue Ouyang1, Junxiu Liu | 2019 | Yes | Yes | Yes | √ |
| 39 | Xuqi Wang , Xiangguo Cheng | 2019 | Yes | Yes | Yes | √ |
| 40 | Hongbo Li a , Qiong Huang a , Jian Shen b , Guomin Yang c , Willy Susilo c | 2019 | Yes | Yes | Yes | √ |

C. Data Analysis

- RQ1: How does key management service for securing encryption key?
Based on research done in 2019–2023 about kKey Management Service for Securing Encryption Key, the answers to Research Question 1 (RQ1) led to the development of several applications for encryption keys. Cryptography Key. The outcomes are shown in Table III.

TABLE III. Encryption Key

| No. | Encryption Key | Paper | Amount |
|-----|--|-------|--------|
| 1 | Key Distribution Server (KDS), key hierarchy (LKH) | 5 | |
| 2 | key management | 9 | |

| | (MTPKM) | | |
|----|---|-------|---|
| 3 | Keyless SSL | 3 | |
| 4 | wireless sensor networks (WSNs) | 10 20 | 2 |
| 5 | | 8 2 | |
| 6 | Advanced Metering Infrastructure (AMI) | 2 | |
| 7 | Key generation center (KGC) | 6 17 | 2 |
| 8 | AKM-IoV | 14 | |
| 9 | Advanced Encryption Standard (AES) | 26 | |
| 10 | VANET | 24 | |
| 11 | HIPAA's (Health Insurance Portability and Accountability Act) | 27 | |
| 12 | CK | 30 | |
| 13 | EVKAKSE | 39 | |
| 14 | CPA | 35 | |
| 15 | Cloud Secure Storage Mechanism | 33 | |
| 16 | SPADE | 32 | |
| 17 | IIBES | 31 | |
| 18 | SHA-512 | 38 | |

- RQ2: What methods are used for key management services to secure encryption keys?
According to the findings of Research Question 2 (RQ2), it is more prevalent to utilize WSN-based IoT and Key Management Systems (KMS) to examine user acceptance of encryption keys based on research done by in 2019–2023, as indicated in Table IV.

TABLE IV. METHODS

| No. | Encryption Key | Paper | Amount |
|-----|---|---------------------|--------|
| 1 | Key Hierarchy (LKH) | 5 31 | 2 |
| 2 | Software Guard Extensions (SGX) and QuickAssist Technology (QAT). | 3 | 1 |
| 3 | WSN-based IoT | 6 10 14 15 20 29 36 | 7 |
| 4 | Key Management Systems (KMS) | 8 2 12 16 17 27 39 | 7 |
| 5 | PGP and S/MIME | 19 39 | 2 |
| 6 | DB-KMM | 24 | 1 |

- RQ3: What are the advantages of the method used to analyze the acceptance of the benefits of using Encryption Key on technology.
WSN-based IoT refers to wireless sensor networks (WNS) used in the Internet of Things (IoT). In this context, Key Management Systems (KMS) are systems or mechanisms used to manage and secure encryption keys in a WSN-based IoT environment. Encryption keys are used to protect the confidentiality of data transmitted over the wireless sensor network. The link between WSN-based IoT, Key Management Systems (KMS), and Key Management Service (KMS) in the context of encryption key security lies in the use of KMS as a

solution for managing and maintaining encryption key security in WSN-based IoT. In a connected and complex environment like IoT, protection of encryption keys is crucial to prevent unauthorized access and protect the confidentiality of data transmitted over wireless sensor networks. Using KMS, organizations can implement security policies, manage key lifecycles, and ensure compliance with applicable security and regulatory requirements, thereby strengthening encryption key security in WSN-based IoT.

- RQ4: What statistical methods are used to analyze user acceptance of ewallet applications?

From the results of Research Question 4 (RQ4) it evaluate the popularity of e-wallet programs among users?

According to the findings of Research Question 4 (RQ4), Comparative analysis is more prevalent among the statistical techniques used to study the Key Management Service For Securing Encryption Key in 2019–2023. Using comparative study, encryption key is more prevalent in 2019–2023.

TABLE V. STATISTICAL METHODS

| No. | Statistical Methods | Paper | Amount |
|-----|--|--|--------|
| 1 | Artificial Neural Network | 1,23 | 2 |
| 2 | Survei, Comparative analysis | 2,4 | 2 |
| 3 | Deskriptif, Comparative analysis | 5,19 | 2 |
| 4 | Comparative analysis | 6, 8, 9, 10, 12, 14, 16, 17, 18, 20, 24, 26, 27, 29, 30, 32, 33, 34,35, 36, 37, 39, 40 | 23 |
| 5 | Deep neural networks (DNNs), Comparative analysis | 13 | 1 |
| 6 | HSDL, Comparative analysis | 25 | 1 |
| 14 | Histogram Analysis, Correlation Analysis, Comparative Analyisi | 38 | 1 |

IV. CONCLUSION

The SLR method can be used to find and research analyze key management services for securing encryption keys, and the benefits of the methods used. This conclusion can be drawn based on the findings of the research that has been done. When studying user acceptability of the most explored E-Wallet apps, wireless sensor networks (WSNs) and key generation centers (KGC), information on the names of encryption keys is collected. This research was done in 2019–2023. Key Management Systems (KMS), which are used to understand and evaluate what influences the Key Management Service for Securing Encryption Key, are more commonly utilized in the approach used to assess the Key

Management Service for four main topics, including the names of encryption keys, methods and statistical methods used to Encryption Key. Comparative analysis is the statistical approach that is used the most.

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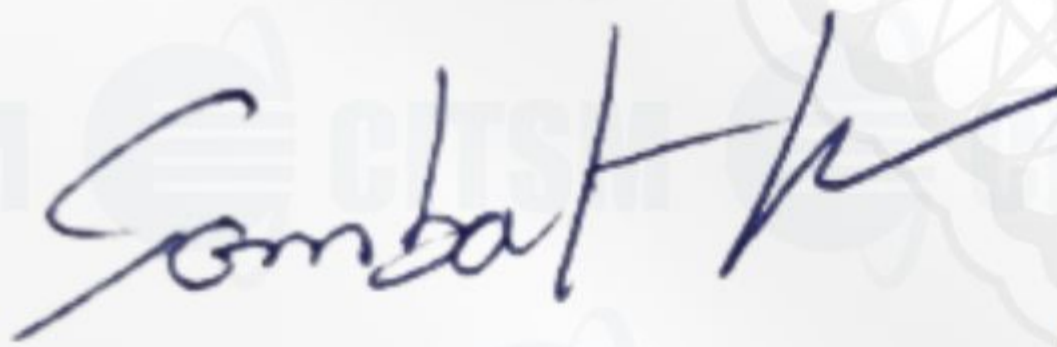
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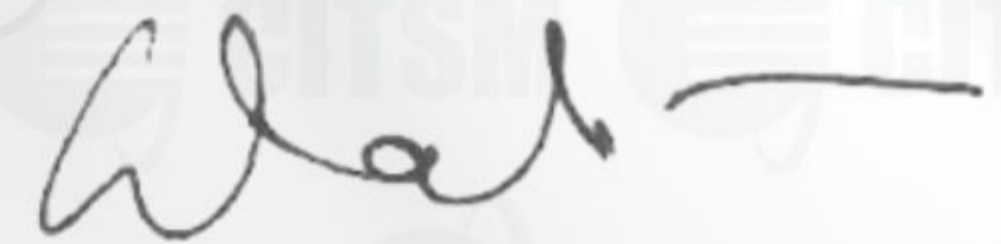
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