**Appendix 5: Characteristics of the included studies and features of AI techniques used for COVID-19.**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| AuthorID | Submission month | Country | Paper status | Purposes/uses of AI techniques | AI branch | AI models/ algorithms | Platform |
| Abbas36 | April | UK | Preprint | Diagnosis of COVID-19 using X-ray images | DL | CNN | PC |
| Abdelmageed64 | March | Sudan | preprint | Vaccine discovery | DL | ANN (unspecified) | PC |
| Al-Qaness72 | February | China | Published | Forecasting the epidemic development | DL | ANN (unspecified) | PC |
| Apostolopoulos37 | March | Greece | Preprint | Diagnosis of COVID-19 using X-ray images | DL | CNN, TL | PC |
| Bai95 | March | China | Preprint | Identifying cases at high risk of progression to severe COVID-19 | DL & ML | MLP, RNN, SVM | PC |
| Barstugan21 | March | Turkey | Preprint | Diagnosis of COVID-19 using CT images | ML | SVM | PC |
| Beck61 | February | Korea | Preprint | Drug repurposing | DL & NLP | CNN & BERT | PC |
| Bukhari38 | March | Pakistan | Preprint | Diagnosis of COVID-19 using X-ray images | DL | CNN | PC |
| Chen J22 | March | China | Preprint | Diagnosis of COVID-19 using CT images | DL | CNN | PC |
| Chen X89 | April | China | Preprint | Segmentation and quantification of infection regions | DL | CNN | PC |
| Chowdhury39 | April | Qatar | Preprint | Diagnosis of COVID-19 using X-ray images | DL | CNN | PC |
| Dandekar73 | March | USA | Preprint | Forecasting the epidemic development | DL | ANN (unspecified) | PC |
| DeCapprio96 | March | USA | Preprint | Identifying cases at high risk of progression to severe COVID-19 | ML | DT & LoR | PC |
| Dutta74 | March | India | Preprint | Forecasting the epidemic development | DL | RNN | PC |
| Fast68 | March | USA | Preprint | Protein structure prediction | DL | RNN | PC |
| Feng49 | March | China | Preprint | Diagnosis of COVID-19 using laboratory tests | ML | DT, LoR, LASSO, AB | PC |
| Fong-a75 | March | China | Preprint | Forecasting the epidemic development | DL | PNN | PC |
| Fong-b76 | February | China | Published | Forecasting the epidemic development | DL & ML | DT, LiR, PNN, SVM | PC |
| Fu23 | March | China | Preprint | Diagnosis of COVID-19 using CT images | DL | CNN | PC |
| Gaal90 | March | Hungary | Preprint | Segmentation and quantification of infection regions | DL | CNN | PC |
| Gao52 | February | USA | Preprint | Drug discovery | DL | RNN & DNN | PC |
| Ge53 | March | China | Preprint | Drug discovery | DL | DNN | PC |
| Ghoshal40 | March | UK | Preprint | Diagnosis of COVID-19 using X-ray images | DL | CNN | PC |
| Gong97 | April | China | Preprint | Identifying cases at high risk of progression to severe COVID-19 | ML | LASSO & LoR | PC |
| Gozes24 | March | China | Preprint | Diagnosis of COVID-19 using CT images & Segmentation and quantification of infection regions | DL | CNN | PC |
| Guo86 | February | China | Preprint | Predicting the potential hosts/reservoirs of 2019-nCov | DL | CNN | PC |
| Hemdan41 | March | Egypt | Preprint | Diagnosis of COVID-19 using X-ray images | DL | CNN | PC |
| Heo69 | March | USA | Preprint | Protein structure prediction | DL | CNN | PC |
| Hofmarcher54 | April | Austria | Preprint | Drug discovery | DL | RNN | PC |
| Hu-a62 | March | China | Preprint | Drug repurposing | DL | MDM | PC |
| Hu-b77 | March | China | Preprint | Forecasting the epidemic development | DL | AE | PC |
| Hu-c78 | March | China | Preprint | Forecasting the epidemic development | DL | AE | PC |
| Huang C79 | March | China | Preprint | Forecasting the epidemic development | DL | CNN | PC |
| Huang L91 | March | China | Published | Segmentation and quantification of infection regions | DL | CNN | PC |
| Jin C25 | March | China | Preprint | Diagnosis of COVID-19 using CT images | DL | CNN | PC |
| Jin S26 | March | China | Preprint | Diagnosis of COVID-19 using CT images | DL | CNN | PC |
| Kumar80 | April | India | Preprint | Forecasting the epidemic development | ML | ARIMA, VAR, GLM | PC |
| Li L27 | March | China | Published | Diagnosis of COVID-19 using CT images | DL | CNN | PC |
| Li M81 | April | China | Preprint | Forecasting the epidemic development | ML | EM | PC |
| Lopez-Rincon50 | April | Netherlands | Preprint | Diagnosis of COVID-19 using genome sequences | DL | CNN | PC |
| Magar55 | March | USA | Preprint | Drug discovery | ML | DT, LoR, MLP, RF, SVM | PC |
| Marini82 | April | Switzerland | Preprint | Forecasting the epidemic development | ML | HAM | PC |
| Meng48 | March | China | Preprint | Diagnosis of COVID-19 using laboratory tests | ML | LASSO & LoR | PC |
| Mizumoto83 | February | Japan | Published | Forecasting the epidemic development | ML | BA | PC |
| Narin42 | March | Turkey | Preprint | Diagnosis of COVID-19 using X-ray images | DL | CNN & TL | PC |
| Ong65 | March | USA | Preprint | Vaccine discovery | ML | DT, KNN, LoR, SVM, RF | PC |
| Ozturk43 | April | Turkey | Published | Diagnosis of COVID-19 using X-ray images | DL | CNN | PC |
| Pandey102 | April | India | Preprint | Raising awareness to Water, Sanitation and Hygiene (WASH) | ML & NLP | CBOW, SM, USEL, PS | Mobile |
| Patankar56 | March | UK | Preprint | Drug discovery | DL | RNN & AE | PC |
| Pirouz84 | March | China | Published | Forecasting the epidemic development | DL | PNN | PC |
| Pourhomayoun98 | April | USA | Preprint | Patient outcome prediction (mortality rate) | DL & ML | ANN, DT, KNN, LoR, RF, SVM | PC |
| Qi101 | March | China | Preprint | Patient outcome prediction (length of hospital stay) | ML | LoR & RF | PC |
| Qiang87 | March | China | Published | Predicting the potential hosts/reservoirs of 2019-nCov | ML | RF | PC |
| Qiao70 | March | Canada | Preprint | Protein structure prediction | DL | CNN & RNN | PC |
| Rahman66 | March | Bangladesh | Preprint | Vaccine discovery | DL | ANN (unspecified) | PC |
| Randhawa88 | February | Canada | Preprint | Predicting the potential hosts/reservoirs of 2019-nCov | ML | KNN, LDA, SVM | PC |
| Saçar demirci71 | March | Turkey | Preprint | Protein structure prediction | ML | DT, NB, RF | PC |
| Sarkar B67 | March | Bangladesh | Preprint | Vaccine discovery | ML | SVM | PC |
| Sarkar J100 | March | India | Preprint | Patient outcome prediction (risk factors associated with mortality) | ML | RF | PC |
| Sethy44 | April | India | Preprint | Diagnosis of COVID-19 using X-ray images | DL & ML | CNN, SVM, TL | PC |
| Shan92 | March | China | Preprint | Segmentation and quantification of infection regions | DL & ML | CNN | PC |
| Shi28 | March | China | Preprint | Diagnosis of COVID-19 using CT images | DL & ML | CNN, RF, LoR, SVM | PC |
| Tang B57 | March | China | Preprint | Drug discovery | DL | ADQN | PC |
| Tang Z93 | March | China | Preprint | Severity assessment | ML | RF | PC |
| Tiwari85 | April | India | Preprint | Forecasting the epidemic development | ML | TSF | PC |
| Ton58 | March | Canada | Published | Drug discovery | DL | DNN | PC |
| Ucar45 | April | Turkey | Published | Diagnosis of COVID-19 using X-ray images | DL | CNN | PC |
| Wang L46 | March | Canada | Preprint | Diagnosis of COVID-19 using X-ray images | DL | CNN | PC |
| Wang Shuai29 | April | China | Preprint | Diagnosis of COVID-19 using CT images | DL | CNN | PC |
| Wang Shuo30 | March | China | Preprint | Diagnosis of COVID-19 using CT images & Identifying cases at high risk of progression to severe COVID-19 | DL | CNN | PC |
| Wang Y51 | February | China | Preprint | Identification of suspected COVID-19 based on respiratory patterns | DL | RNN | PC |
| Wang Z63 | February | China | Preprint | Predicting the safety of Traditional Chinese Medicine | DL | ANN (unspecified) | PC |
| Xu31 | February | China | Preprint | Diagnosis of COVID-19 using CT images | DL | CNN | PC |
| Yan99 | March | China | Preprint | Patient outcome prediction (mortality rate) | ML | DT | PC |
| Ying32 | February | China | Preprint | Diagnosis of COVID-19 using CT images | DL | CNN | PC |
| Yu94 | March | China | Preprint | Severity assessment | ML | DT | PC |
| Zhang H59 | February | China | Preprint | Drug discovery | DL | CNN | PC |
| Zhang J47 | March | China | Preprint | Diagnosis of COVID-19 using X-ray images | DL | CNN | PC |
| Zhao33 | March | USA | Preprint | Diagnosis of COVID-19 using CT images | DL | CNN | PC |
| Zhavoronkov60 | February | Honk Kong | Preprint | Drug discovery | DL & ML | AE, GAN, GA, LM, RL | PC |
| Zheng34 | March | China | Preprint | Diagnosis of COVID-19 using CT images | DL | CNN | PC |
| Zhou35 | March | China | Preprint | Diagnosis of COVID-19 using CT images | DL | CNN & TL | PC |
| Abbreviations | **AB**: AdaBoost; **ADQN**: Advance Deep Q-learning network; **AE**: Auto-encoders; **ANN**: Artificial Neural Network (unspecified); **ARIMA**: Auto-Regressive Integrated Moving Average Model; **BA**: Bayesian analysis; **BERT**: Bidirectional Encoder Representations from Transformers; **CBOW**: Continuous Bag of Words; **CNN**: Convolutional neural network; **DL**: Deep Learning; **DNN**: Deep neural network; **DT**: Decision tree; **EM**: Eureqa Modelling; **GA**: Genetic algorithm; **GAN**: Generative adversarial network; **GLM**: Generalized Logistic growth Model; **HAM**: Holistic Agent-based Model; **KNN**: K-Nearest Neighbors; **LASSO**: Least Absolute Shrinkage and Selection Operator; **LDA**: Linear Discriminant Analysis; **LiR**: Linear Regression; **LM**: Language model; **LoR**: Logistic Regression; **MDM**: Multi-task deep model; **DL**: Machine Learning; **MLP**: Multilayer perceptron; **NB**: Naive Bayes; **NLP**: Natural Language Processing; **PNN**: Polynomial Neural Network; **PS**: Porter Stemming; **RF**: Random Force; **RL**: Reinforcement learning; **RNN**: Recurrent Neural Network; **SM**: Skip-gram model; **SVM**: Support Vector Machine; **TL**: Transfer learning; **TSF**: Time Series Forecasting; **USEL**: Universal-sentence-encoder-large; **VAR**: Vector Auto Average. | | | | | | |