In [[kaplan1996lagrangian](#LyXCite-kaplan1996lagrangian)] the authors proposed a diagnostic model for calculating concentration distribution of a passive scalar in a built-up area .This model basically requires measurements of the wind velocity and direction at a certain reference height above the obstacles. It is effectively able to predict 3-d concentration distributions and is also able to identify concentration accumulation at specific and precise points. It also succeeds in predicting concentration distribution both quantitatively and qualitatively. The model can be further used to study many air pollution phenomena.

The authors of [[de1998novel](#LyXCite-de1998novel)] proposed a detailed approach to model dispersion which widely aims at combining the advantages of puff models and particle models. The resulting model type is called Puff-Particle Model (PPM). In PPM, hundred puffs in three dimensional space is collectively simulated, in comparison to many thousand particles usually required in pure particle models. The overall PPM concept is quite simple, while puff growth is described by the concept of relative dispersion which accounts for eddies smaller than the puff, causing effect of meandering. The variation between the trajectories of different puffs due to larger eddies, those larger than the actual puff size is simulated by introducing puff-centre trajectories derived from particle trajectories from a particle model.

In [[raza20023d](#LyXCite-raza20023d)] the authors proposed that the Lagrangian Monte Carlo particle dispersion models works very effectively for the atmospheric dispersion of effluents. It was also mentioned that in order to incorporate the effect of vertical wind shear, the modified dispersion coefficient should be used with the existing Gaussian plume model. As an alternative, a much reliable 3D numerical model was used at a slightly greater computational cost. This numerical model can also be used in a complex topography region with hills and mountains, where mostly the conventional Gaussian models seem to be less effective and mainly not suitable.

The authors of [[li1996simplified](#LyXCite-li1996simplified)] presented a model of (Nitrogen Oxide)NO emissions for a power plant boiler. It was modelled from the extended Zeldovich mechanism and it is observed that it requires only a few physical parameters obtained from experiments. A set of fresh new test data to compare the simulated values with real measurements was used. It was observed that model performed well with real plant input variables. The proposed model can also be used in other applications such as for optimising boiler operation and combustion control system design.

In [[elshafei2006prediction](#LyXCite-elshafei2006prediction)] the authors proposed a model which provided an efficient polynomial network solution to the problem of tedious on-line monitoring of NOx emission from industrial boilers. The effect of six variables was considered and studied using 3D CFD simulation model and was used by polynomial networks for prediction of NOx and Oxygen (O2) in the exhaust flue. The prediction of NOx and O2 are both essential for efficient operation and functioning of the boiler while maintaining the NOx pollutant within a tolerable limit. The proposed soft sensor has a simple modular structure for low cost implementation which is greatly an advantage. This sensor can also be integrated with the boiler control system for optimization of boilers operation increasing the effectiveness.

In [[yu2008pm](#LyXCite-yu2008pm)] the authors presented a model, to study on the factors to affect the Particulate Matter (PM-10) pollution and developed a PM-10 prediction model using (Multi linear perceptron) MLP neural network model. A neural model was used especially because it has an advantage that there doesn’t exist a need to analyze the input data before the data are used, like that in regression model. Also, to improve and optimize the performance of the proposed model it required to shorten the learning period from year to quarter month and to learn and predict PM-10 with multiple networks according to the PM-10 levels.

The authors of [[xiaojun2015iot](#LyXCite-xiaojun2015iot)] proposed a good solution to the complexity of air pollution. It was observed that use of a large number of sensors ensures monitoring accuracy, greatly reduces monitoring cost and makes monitoring data in monitoring area more perfect and systematic. It was also noticed that addition of more meteorological factors would highly improve the prediction performance. It used past 5 years data for training the model, showing that large sample data can increase performance and train the model well. The overall experiment used IOT and neural network for air pollution monitoring and forecasting.

The authors of [[yang2017new](#LyXCite-yang2017new)] proposed an Air quality monitoring system with and an early warning system, including an assessment module and a forecasting module. The model was able to successfully identify the major pollutants in two cities. The experimental results showed that the proposed model had the best accuracy and stability compared to general regression neural network (GRNN), extended nearest neighbor (ENN), MCSDE-ENN and MCSDE-EEMD-ENN.

In [[kang2018air](#LyXCite-kang2018air)] the authors compared research work on air quality evaluation based on big data analytics, machine learning models and techniques and also highlighted some future resource issues, needs and challenges. It was stated that the accuracy of the air quality evaluation and assessment is affected by device faults, battery issues and sensor network. In this it was also mentioned that due to this issue there is a strong need for research in data quality modelling and automatic real-time validation. Also air in a city might be considered as a multi-level air system. The need for research and development of real-time air quality monitoring and evaluation and analysis on multiple levels was also highlighted. It was said that smart cities in the future must support real time air quality monitoring, evaluation and prediction. This gives rise to the need to develop integrated and dynamic air quality model using hybrid machine learning models.

The authors of [[ayele2018air](#LyXCite-ayele2018air)] proposed a IOT based air quality monitoring and prediction system. In this model sensor data of a humidity and temperature sensor (DHT11) and a gas sensor (MQ135) was stored on the cloud using a web-enabled microcontroller (ESP8266). This data was then processed (converted into CSV) and used to train the machine learning model and forecast the pollution rate. The machine learning algorithm used is called Long Short Term Memory (LSTM) which is a modification Recurrent Neural networks (RNN).

In [[zhu2018machine](#LyXCite-zhu2018machine)] the authors proposed refined models for the prediction of hourly concentration of air pollution using meteorological data of previous days by formulating the prediction over a 24 hour period as a multi-task learning (MTL) problem. The results showed that the proposed light formulation achieved the best result compared to Baseline, and heavy formulation.

In [[delavar2019novel](#LyXCite-delavar2019novel)] the authors conducted a comparative study of machine learning methods including nonlinear autoregressive exogenous inputs (NARX), artificial neural network (ANN) and support vector regression (SVR) which been employed for air pollution prediction and the NARX was selected as the optimum one. The effective parameters for air pollution prediction have been determined in this research. This research used daily data of the pollutants. It also mentioned that the quality of the proposed model can be significantly improved if hourly data is implemented. Considering the importance of air pollution problem, it was recommended that the number of air pollution measuring stations increases so as to allow for a better fit on the air pollution prediction.

The authors of [[yi2018deep](#LyXCite-yi2018deep)] proposed a DNN-based approach to predict air quality. For this purpose a novel distributed fusion architecture to fuse heterogeneous urban data was adopted, which could simultaneously capture the individual and holistic effects from all influential factors affecting air quality. This approach achieves a higher accuracy in both general cases and sudden changes.

The authors of [[qu2009dynamic](#LyXCite-qu2009dynamic)] developed a dynamic model to estimate source emissions and predict contaminant concentration in closed spaces. This was realized by using Extended Kalman Filter (EKF) algorithm and least square method based on an established variable –structural contaminant model. The model could realize to track and real-time predict contaminant concentration, and identify source emission rate accurately and efficiently.