**LITERATURE SURVEY**

**TEAM ID: PNT2022TMID43192**

**MACHINE LEARNING-BASED PREDICTIVE ANALYTICS FOR AIRCRAFT ENGINE**

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| **S.NO** | **PAPER** | | **AUTHOR** | **YEAR** | **METHOD** | **PRECISION** |
| 1 | Machine  Learning-Based  Predictive  Analytics for  Aircraft Engine Conceptual Design. |  | Michael T.  Tong Glenn  Research  Center,  Cleveland,  Ohio | 2019 | The adoption of machine learning-based data analytics is rapidly taking hold across various industries, producing autonomous systems that support human decision-making. This work explored the application of machine learning to aircraft engine conceptual design. Supervised machine-learning algorithms for regression and classification were employed to study patterns in an existing, open-source database of production and research turbofan engines, and resulting in predictive analytics for use in predicting performance of new turbofan designs. | 98% |
| 2 | Using  Machine  Learning To  Predict Core  Sizes of  High-Efficienc y Turbofan  Engines | | Tong, M.T | 2019 | This work explored the application of machine learning to engine preliminary design. Engine coresizeprediction was chosen for the first study because of its relative simplicity in terms of the number of input variables required (only three). Specifically, machine-learning predictive tools were developed for turbofan engine core-size prediction, using publicly available data of two hundred manufactured engines and engines that were studied previously in NASA aeronautics projects. | 94% |

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| 3 | Using Density  Estimation in  Comparing Input Signals for Gas Turbine  Engine  Transient  Models | [Brian](https://www.researchgate.net/scientific-contributions/Brian-Kestner-2056975389)  [Kestner](https://www.researchgate.net/scientific-contributions/Brian-Kestner-2056975389)[,Metin F.](https://www.researchgate.net/scientific-contributions/Metin-F-Ozcan-2058640012)  [Ozcan](https://www.researchgate.net/scientific-contributions/Metin-F-Ozcan-2058640012)[,Jimmy C.](https://www.researchgate.net/profile/Jimmy-Tai)  [M. Tai](https://www.researchgate.net/profile/Jimmy-Tai)[,Georgia](https://www.researchgate.net/institution/Georgia-Institute-of-Technology)  [Institute of](https://www.researchgate.net/institution/Georgia-Institute-of-Technology)  [Technology](https://www.researchgate.net/institution/Georgia-Institute-of-Technology) | 2013 | Gas turbine engines are already complex and nonlinear systems. Nevertheless, gas turbines must become more complex and nonlinear over time to meet the more challenging requirements in the future. Consequently, the different gas turbine engine model types used in the gas turbine design and development processes must become more complex and nonlinear over time. However, simpler models will still be derived from the complex and nonlinear models for applications such as: controller design. Also, the complex and nonlinear models can be run in transient to generate data for the faster data driven transient models. | 95% |
| 4 | A simple way to Prevent Neural Networks from overfitting. | NitishSrivastava,  GeoffreyHinton,  AlexKrizhevsky,IlyaSutskever,  Ruslan Salakhutdinov | 2014 | Deep neural nets with a large number of parameters are very powerful machine learning systems.However,overfitting by combining the predictions of many different large neural nets at test time.Dropout is a technique for addressing this problem.The key idea is to randomly drop units(along with their connections)from the neural network during training.This prevents units from co-adapting too much. Duringtraining,dropout samples from an exponential number of different thinned networks. |  |

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| 5 | Machine learning based predictive analytics for aircraft engine | S.M.,  Haller, W.J., Tong,  M.T. | 2017 | Big data and artificial intelligence/machine learning are transforming the global business environment. Data is now the most valuable asset for enterprises in every industry. Companies are using data-driven insights for competitive advantage. With that, the adoption of machine learning-based data analytics is rapidly taking hold across various industries, producing autonomous systems that support human decision-making. This work explored the application of machine learning to aircraft engine conceptual design. Supervised machine-learning algorithms for regression and classification were employed to study patterns in an existing, open-source database of production and research turbofan engines, and resulting in predictive analytics for use in predicting performance of new turbofan designs. | 97% |
| 6 | Effect of nutrition care provided by primary health professionals  on adults' dietary  behaviours: a  systematic review | [Mark](https://arc.aiaa.org/doi/abs/10.2514/6.2009-6942)  [Guynn](https://arc.aiaa.org/doi/abs/10.2514/6.2009-6942),  [Jeffery](https://arc.aiaa.org/doi/abs/10.2514/6.2009-6942)  [Berton](https://arc.aiaa.org/doi/abs/10.2514/6.2009-6942),  [Kenneth](https://arc.aiaa.org/doi/abs/10.2514/6.2009-6942)  [Fisher](https://arc.aiaa.org/doi/abs/10.2514/6.2009-6942),  [William](https://arc.aiaa.org/doi/abs/10.2514/6.2009-6942)  [Haller](https://arc.aiaa.org/doi/abs/10.2514/6.2009-6942),  [Michael](https://arc.aiaa.org/doi/abs/10.2514/6.2009-6942)  [Tong](https://arc.aiaa.org/doi/abs/10.2514/6.2009-6942) and  [Douglas](https://arc.aiaa.org/doi/abs/10.2514/6.2009-6942)  [Thurman](https://arc.aiaa.org/doi/abs/10.2514/6.2009-6942) | 2009 | The desire for higher engine efficiency has resulted in the evolution of aircraft gas turbine engines from turbojets to low bypass ratio first generation turbo fans. It is possible that future designs will continue this trends leading to very high or ultra high bypass ratio engines. | 90% |

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| 7 | A Method for Stochastic Optimazation | [DiederikP.](https://arxiv.org/search/cs?searchtype=author&query=Kingma%2C+D+P)  [Kingma](https://arxiv.org/search/cs?searchtype=author&query=Kingma%2C+D+P),  [Jimmy Ba](https://arxiv.org/search/cs?searchtype=author&query=Ba%2C+J) | 2015 | An algorithm for first-order  Gradient-based optimization of stochastic objective functions, based on adaptive estimates of lower-order moments. The method is straightforward to implement, is computationally efficient, has little memory requirements, is invariant to diagonal rescaling of the gradients, and is well suited for problems that are large in terms of data and/or parameters. The method is also appropriate for non-stationary objectives and problems with very noisy and/or sparse gradients. | 96% |
| 8 | Refined  Exploration of  Turbofan  Design  Options for an  Advanced  Single-Aisle  Transport | Mark D.  Jeffrey J.  Berton, Kenneth L.  Fisher, William J. Haller, and Michael T. | 2011 | As aircraft manufacturers Boeing and Airbus continue to develop and mature new twin-aisle, wide body aircraft designs in the 210-350 seat class, for scheduled first deliveries in 2011 and 2013 respectively, significant attention is also being paid to the potential for future new products in the smaller Boeing 737/Airbus A320  Class. Options under consideration include taking advantage of evolving propulsion advances through a re-engaging program in the fairly near term, to development of a completely new vehicle in the farther term. Airbus has chosen to initially pursue the near term benefits of re-engaging, while Boeing continues to evaluate its options. | 94% |