

bottom of the reactor vessel and conceivably into the ground below—the so-called China syndrome. Although it might appear that this deep underground burial site would be an ideal safe haven for a radioactive blob, there would be danger of a steam explosion should the molten mass encounter water. This nonnuclear explosion could spread radioactive material to the areas surrounding the power plant. To prevent such an unlikely chain of events, nuclear reactors are designed with emergency core cooling systems, requiring no power, that automatically flood the reactor with water in the event of a loss of coolant. The emergency cooling water moderates heat build-up in the core, which in turn prevents the melting of the reactor vessel.

A continuing concern in nuclear fission reactors is the safe disposal of radioactive material when the reactor core is replaced. This waste material contains long-lived, highly radioactive isotopes and must be stored for long periods of time in such a way that there is no chance of environmental contamination. At present, sealing radioactive wastes in waterproof containers and burying them in deep salt mines seems

Natural Language Processing (or NLP) is applying Machine Learning models to text and language. Teaching machines to understand what is said in spoken and written word is the focus of Natural Language Processing. Whenever you dictate something into your iPhone / Android device that is then converted to text, that's an NLP algorithm in action.

You can also use NLP on a text review to predict if the review is a good one or a bad one. You can use NLP on an article to predict some categories of the articles you are trying to segment. You can use NLP on a book to predict the genre of the book. And it can go further, you can use NLP to build a machine translator or a speech recognition system, and in that last example you use classification algorithms to classify language. Speaking of classification algorithms, most of NLP algorithms are classification models, and they include Logistic Regression, Naive Bayes, CART which is a model based on decision trees, Maximum Entropy again related to Decision Trees, Hidden Markov Models which are models based on Markov processes.

A very well-known model in NLP is the Bag of Words model. It is a model used to preprocess the texts to classify before fitting the classification algorithms on the observations containing the texts.

In this part, you will understand and learn how to:

Clean texts to prepare them for the Machine Learning models,

Create a Bag of Words model,

Apply Machine Learning models onto this Bag of Words model.

Enjoy Machine Learning!

Our understanding of physics at short and long distances is far from complete. Particle physics is faced with many questions: why is there so little antimatter in the Universe? Do neutrinos have a small mass, and if so, how much do they contribute to the “dark matter” holding the universe together gravitationally? How can we understand the latest astronomical measurements, which show that the expansion of the universe is accelerating and that there may be a kind of “antigravity force” acting between widely separated galaxies? Is it possible to unify the strong and electroweak theories in a logical and consistent manner? Why do quarks and leptons form three similar but distinct families? Are muons the same as electrons (apart from their different masses), or do they have subtle differences that have not been detected? Why are some particles charged and others neutral? Why do quarks carry a fractional charge? What determines the masses of the fundamental particles? The questions go on and on. Because of the rapid advances and new discoveries in the related fields of particle physics and cosmology, by the time you read this book some of these questions may have been resolved and others may