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**Technological Forecasting and Assessments: It's challenges**

**Introduction:**

In the modern world, change is the only constant. Technology is one such field that keeps changing, effectively transforming human lives with it. The changes in technology have caused a transformation in several other sectors, including media, healthcare and education. These transformations have entirely changed the way we live in the last few decades. Hence, the world's tech giants feel the need to predict these changes somehow; so that they can be the first to capitalize on them in this race for technological superiority. Making the first move is key in this cutthroat competitive world.

This is why Technological Forecasting is a fast-emerging field of research that deals with making models that deliver predictions regarding the future of technological advancements. Using complex algorithms that process historical data and present changes in technology, researchers try to describe what the future has to hold in terms of new trends and technologies.

**Aspects and Methods**

A technological forecast deals with certain characteristics of technology, such as the future of markets, the power usage of a particular region, the number of mobile phones used in the year 2025 etc. As the fields of application are so huge, there is no single method that can cater to all of them. Hence every set of researchers choose a suitable method from a large number of methods available to achieve an accurate result.

Some commonly applied methods of technical Forecasting include Forecasting by analogy, growth curves, extrapolation, horizon scanning and Delphi method. Certain other techniques, such as the expensive computer-based "Pattern" approach, is used by some of the bigger tech companies on exclusive projects with lots of funding. All these methods utilize the analysis of raw data from the past using advanced statistical techniques such as regression to interpret the data in a more comprehensible way and use those patterns and observations to make predictions.

Some researchers classify forecasting methods according to the different ways in which people view the future. In this way, they are grouped into five groups, namely Extrapolators, Pattern Analysts, Goal Analysts, Counter Punchers and Intuitors.

A particularly important and widely used method is the "Delphi" method, which was developed by the US Army Air Corps in 1944, at the beginning of the Cold War with Russia to predict the future technologies in ammunitions that might be used against them. This was one of the first instances of technological Forecasting in the world, and this method was used afterwards in fields like space progress, population control and scientific progress in general.

**Utility**

Technological Forecasting has a vast number of uses today, and a few important ones have been listed below:

* Predicting the number of patients suffering from a certain disease at any given time in the future.
* Tracking the patterns of online media consumption of consumers and engagement on posts in social media.
* Exploring the possibilities of virtual healthcare services, and remote surgeries using robots in a post-covid world.
* Possibilities of virtual schooling and work from home offices post pandemic.
* Predicting climate change and searching for greener alternatives in order to fight against it.

**Challenges**

Technical Forecasting is an extremely difficult process to master and execute, and each field of application comes with its unique set of challenges in execution. Forecasting is a rewarding and challenging occupation, but it is not easy to build models for forecasting the choices and patterns of millions of users.

One of the fundamental challenges faced by the analysts is making design challenges. There are a lot of variables in the design process of a new product, and improper understanding of the choices and variables can be a very costly mistake. Several factors must be taken into account, including but not restricted to production time, specifications of product, location and people catered to.

Another obstacle is the order of resolution settling, or the order in which priority is given to different factors or "taxonomies", and the method used for Forecasting using each of the taxonomies. The challenge is to produce a result that is free from bias of any kind, and this may seem simple but it is a huge task in itself.

The most difficult choice in Forecasting is the method or algorithm used. Most of the time an algorithm can be determined from the data used for prediction. The algorithms differ in order of execution and/or methodology. Choosing improper or unsuitable methods can result in loss of capital or precious time.

In the technical industry, every innovation proves fatal for the previous generation of products and services. Because of this, there is very little or scattered amount of data to work with. Hence in most cases the data is not suitable for rigorous statistical analysis, and we can only scratch the surface of the prediction using it.

Mostly the forecasts are not deployed individually, but there is collaboration between individuals and firms. Therefore, it is important for the researcher to align the qualitative model and the actual requirements of the collaborators. Finally, the forecasters will have limited budgets and tight deadlines to work with. Taking the schedules into account and delivering an accurate and budget-friendly model should be the top priority of the forecasters.

**Conclusion**

In today's day and age, where we are slowly transforming into a completely digital future, forecasters are in heavy demand, and they get handsomely paid. Hence many mathematicians, statisticians and developers are looking to get into this field of analysis, which is both interesting and provides a challenging work environment. Looking back at the challenges faced by the researchers, it is easy to see why technical Forecasting is such a difficult skill to master that even a small mistake in the prediction model can have disastrous consequences. It is an extremely rewarding and satisfying occupation. Forecasting has had a positive impact our lives by bringing new innovations and technologies into our hands. It has taken us generations upon generation to reach the stage of technological prowess that we are at, and there's no looking back now. Technical Forecasting has helped us predict these changes to a big extent in the past, and I hope it will continue to do so in the future.