The Chronicles of a Stationarnian Living in a Whole New World

by Thato Magano

Tym-Syries was in the business of extrapolation. The town was located in the south-west of the continent of Statistician, where data ports were always busy importing data from all walks, streams, and avenues of life. Upon arrival at the ports, they would be well packaged and shipped off to the relevant parts of the country that would be best suited to handle the extrapolation. The first thing they usually checked was the variance and the mean. If they were stationary, they would get sent out to Stationarnia, a tiny little province in the far north that nearly ceased to exist due to a scandalous relationship. Otherwise, everything else would be sent out to Non-Stationarnia.

In the early 2000s, Stationarnia faced a significant threat. The community was initially divided into two parts: the Autoregressive (AR) and the Moving Average (MA). The communities hardly mingled, and everyone kept to themselves. On the MA side of life, their focus was on determining the order of the process using the Auto-Correlation Function (ACF). They had a foolproof system that allowed them to do their work. They knew they could trust the ACF to yield the right results if the data they received were theirs.

Across the fence was the AR community. The AR community knew that if a model came in where they had to calculate the order, then the Partial-Auto-Correlation Function (PACF) would assist them in determining it. The community had a working system, and everything was as it should be.

One fateful afternoon, a young MA maiden with fair, radiant skin and silky-smooth black hair caught the eye of a lean, young AR gentleman. It was as though his entire life had come to a standstill. She was just that perfect, and he could not believe it. But of course, their love would be forbidden, and he couldn't afford to entertain the idea of them being together. He decided that a simple hello would be enough for him.

The simple hello became a picnic date and a loving relationship as time passed. First came the hello, then came the hug, and after a few months of having stolen moments, a stork delivered a baby boy to the residences of the MA maiden. The baby boy was perfect, and nobody suspected that he was, in fact, an ARMA baby. She kept it a secret because many things could go wrong if other people found out.

The young MA maiden raised her baby alone as she and the young AR gentleman were not allowed to be together. She raised him as well as she could, but the young boy with the absent father soon turned into an unruly brat that nobody could handle. Since he had the genetic makeup of an $AR(p)$ and $MA(q)$ model, he could not get any work done correctly. Since the ACF would only yielded the correct answers under the condition that the model was purely MA, the result that baby ARMA would get was constantly incorrect. This drew the attention of many since there has never been a single case

of a model unable to yield the correct details. People started asking questions: who exactly was this little boy, and where did he come from? Suspicions grew when they questioned the mother about the child's paternity, and she would not answer. This left the community uneasy.

News spread like wildfire, and before they knew it, members of the AR community heard about the boy. Thinking that maybe the stork had delivered the child to the wrong house, the chief of Autoregression had a meeting with the head of MA for the child to use the PACF to process data. He failed dismally in identifying the correct order.

The general consensus was reached that he would be banished alongside his mother. Even though she had lost everything, the maiden did not have a single regret, and she loved her son. He grew up to be a young man filled with anger. He was angry at himself for being unable to do the basic and bare minimum. He was angry at the community for throwing his mother out.

On one sunny day, while hunting for food, the boy wandered into the territory of Non-Stationarnia. A security guard found him outside the Tentative Models factory. Not knowing that he was not part of Non-Stationarnia, the security guard scolded him about being late for work and told him to hurry along. He was given a name tag: ARIMA(p,d,q).

He wanted to leave, but he realised that he had nothing to lose by staying at Non-Stationarnia since he had been banished from the only home that he ever knew. He was assigned to the Extended Sample Auto-Correlation Function sector at the factory, where he worked very well.

He went home to tell his mother he had found a place where he felt he belonged. His mother told him to be careful because he was not one of them.

Nearly six months later, during a night out with his friends, having drunk a bit too much, he let it slip that he was not a part of their community and was actually of stationary decent. That caught the attention of the bartender, who notified authorities. Early the following day, he was called to do a DNA test which confirmed that he had a constant mean and variance. However, that was also when the truth came out that he was an ARMA baby. The event caused a nationwide stir. Everyone asked themselves how it could be that a stationary model could not perform well in his own world but could perform so well in another.

It was then concluded that since there was a new breed of stationary models, they would simply use the non-stationary model's techniques. That is how we came to have stationary ARMA models with the model identification of non-stationary models.