

## Motivation

- The impact fake news have on the world (political polarization, reduced trust in the media and institutions, incitement to violence, etc.)
- Shortcomings of fact-checking websites which are currently used
- The shortcomings of the majority of historical but also current studies which don't recognize the dynamic everchanging nature of the web
- The changes in data, specifically in the topics of the posts, can lead to data drifts which lead to static non-adaptive models being no longer accurate after the change occurred, that's why there is a need to use adaptive models which can handle the changes

## Aims and Objectives

- To simulate a dynamic online environment using data streams
- To compare the efficiency between adaptive and non-adaptive models in fake news detection tasks while using data streams
- To create topic changes in the data (simulation of real circumstances in which the talked about topics change very often in the online environment)
- To verify if the change of topic leads to the emergence of concept drifts
- To compare the impact conceptual drifts have on the effectiveness of individual models (adaptive and non-adaptive ones)

## Experiments

Six experiments were performed in total. In the first three of the experiments no artificial topic change was created, in the remaining three experiments topic change was created by mixing different topics from different datasets to simulate the changes which can lead to the creation of data drifts. In the graphical representation (Fig. 1 & Fig. 2) the difference between a non-adaptive and an adaptive model is obvious. The dataset used for this experiments consisted of two different topics so there is a major topic changed that led to the emergence of concept drifts. The adaptive model could handle the change very well and didn't lose its efficiency in detecting the fake news, meanwhile the non-adaptive model couldn't handle the change and lost its efficiency after the topic change.

Fig. 1. Non-adaptive model (dual-topic)

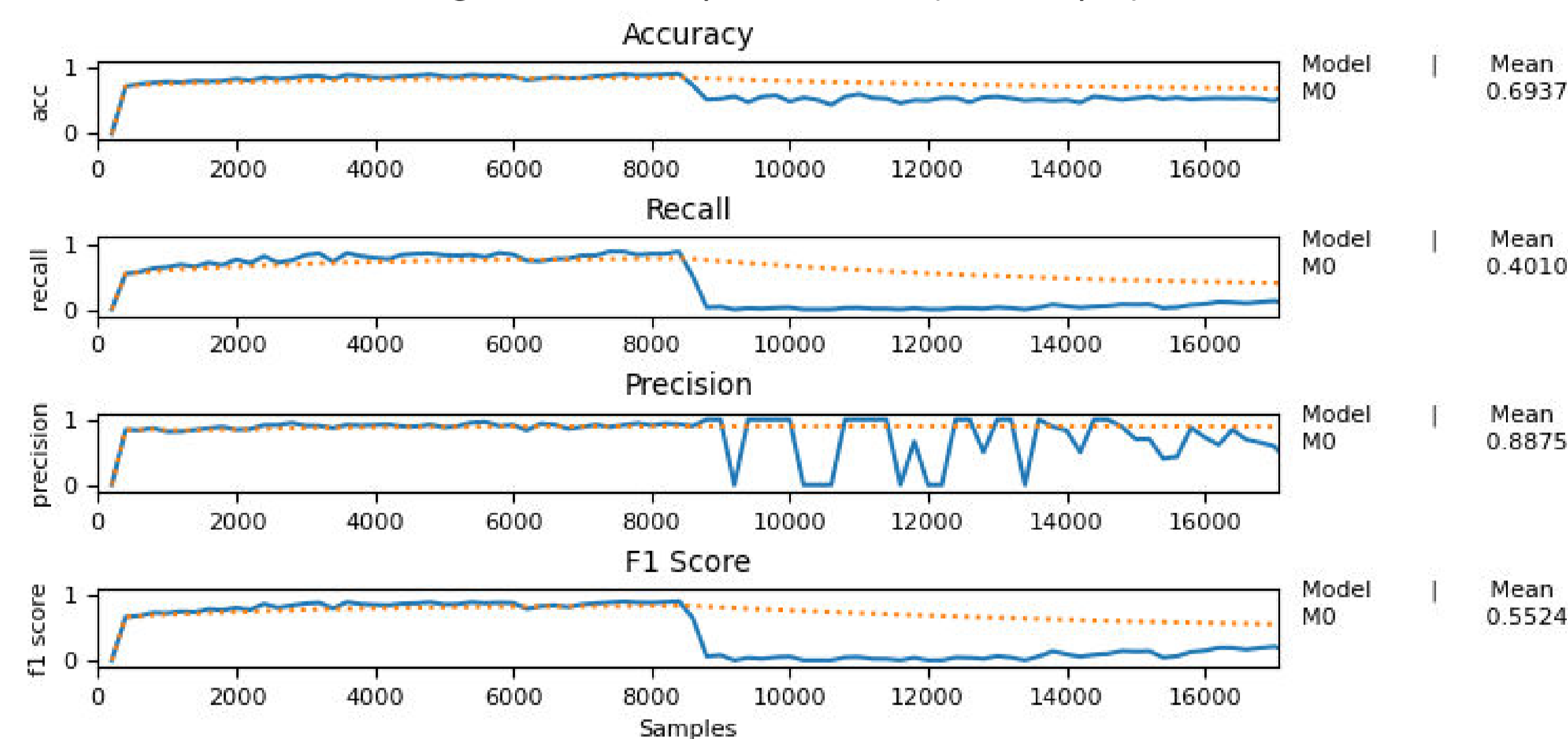
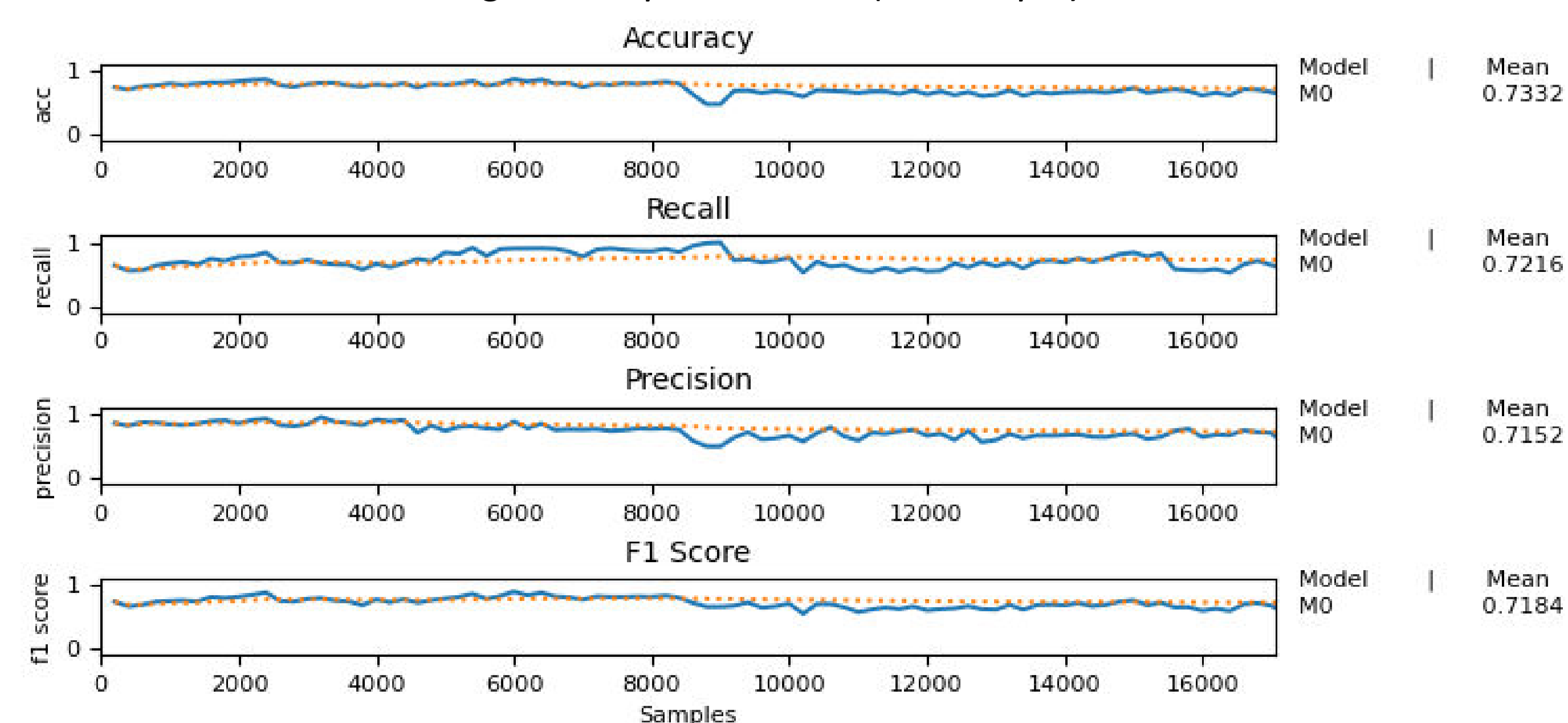


Fig. 2. Adaptive model (dual-topic)



Another example proving the benefits and the need to use adaptive models is from an experiment in which multiple topic changes occurred:

Fig. 3. Non-adaptive model without drift detection abilities:

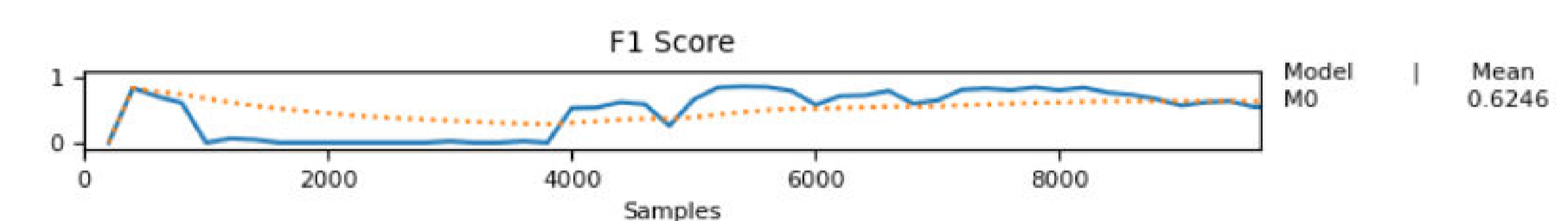
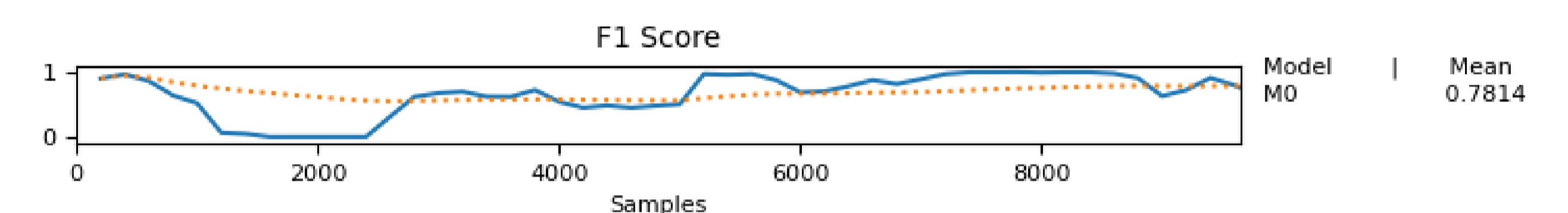


Fig. 4. Adaptive model with drift detection abilities



## Conclusion

From the results of the experiments, the hypothesis that non-adaptive models used on data streams would be less efficient compared to adaptive models was confirmed. Overall, the worst performance of all the used models was in the case of the basic non-adaptive models. However, the adaptive versions showed very good results and outperformed the non-adaptive versions by a wide margin. It is important to note that all versions using any drift detector had better results than the models without one, which confirms the importance of the drift detectors themselves. Considering the results of all experiments, it is clear that adaptive models and drift detectors are very important in the task of classifying and identifying fake news using data streams, because non-adaptive models cannot maintain efficiency in such dynamic environments.