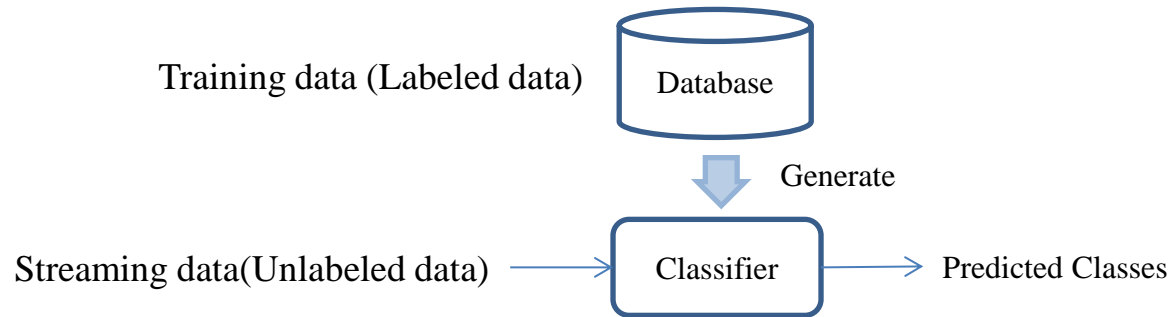


# **Analysis of Particle Filtering as an Effective Approach to Handling Concept Drift in Streaming Data**

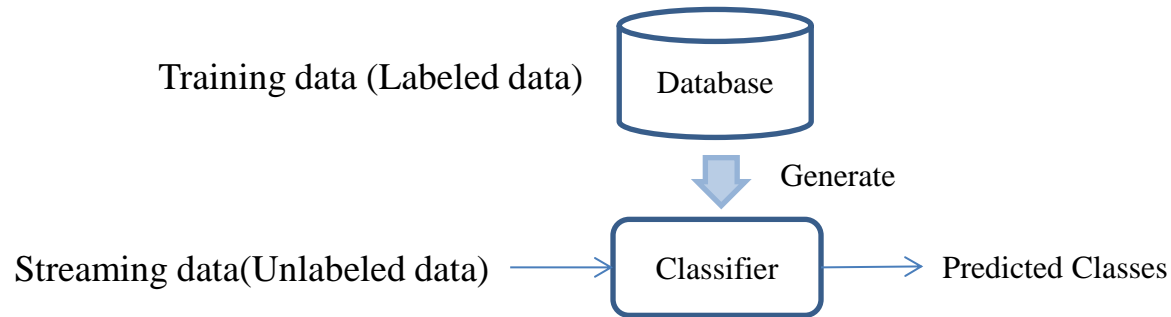
Tegjyot Singh Sethi

<https://github.com/tegjyotsingh/Incremental-Classification>

# Streaming Data and Concept Drift



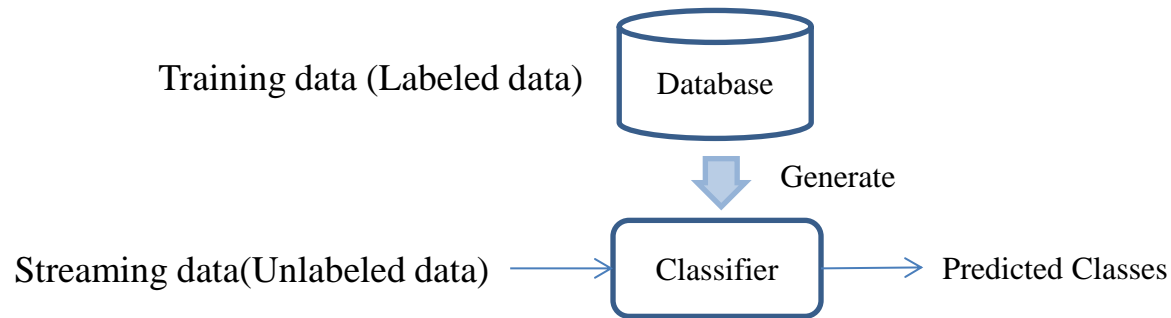
# Streaming Data and Concept Drift



## Challenges in Stream Mining

- Scalability and Response Time
- Robustness
- Concept Drift

# Streaming Data and Concept Drift

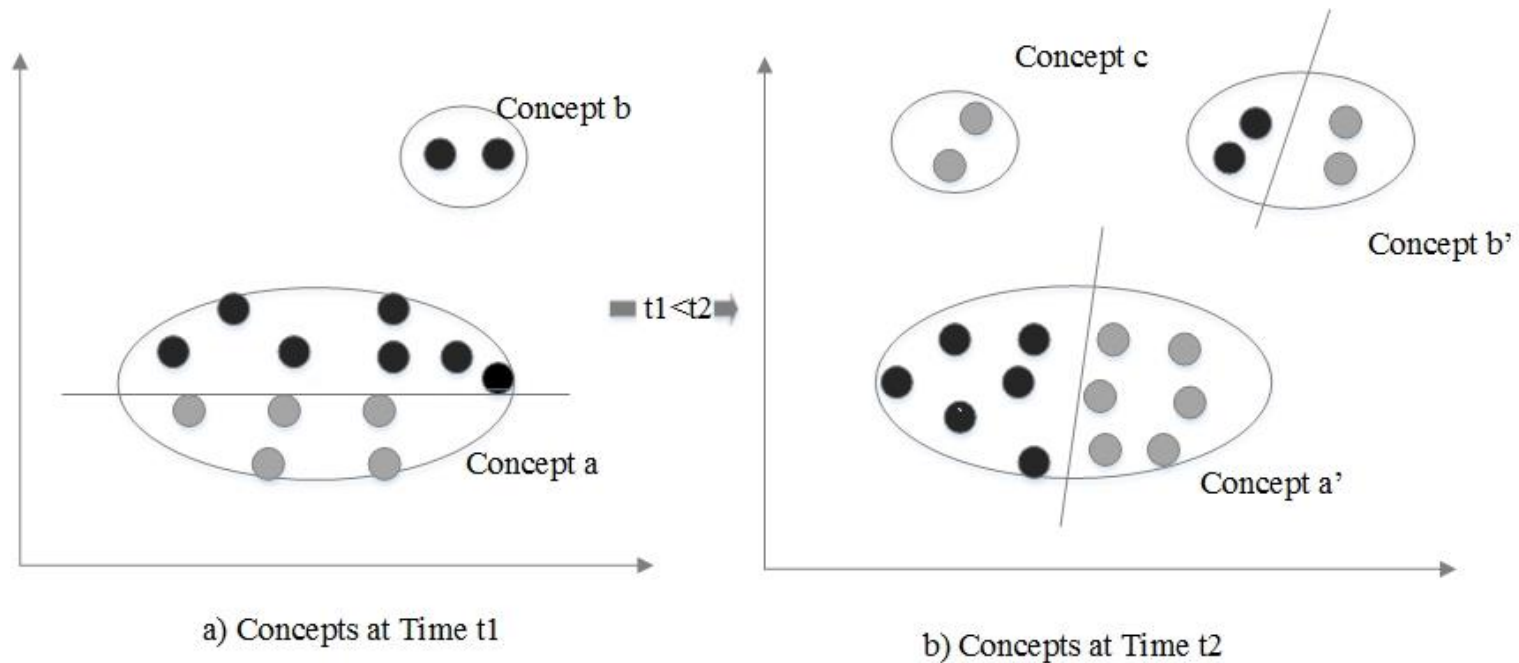


**Concept Drift:**  $P_t(y | x_i) \neq P_{t+1}(y | x_i)$ .

## Challenges in Stream Mining

- Scalability and Response Time
- Robustness
- Concept Drift

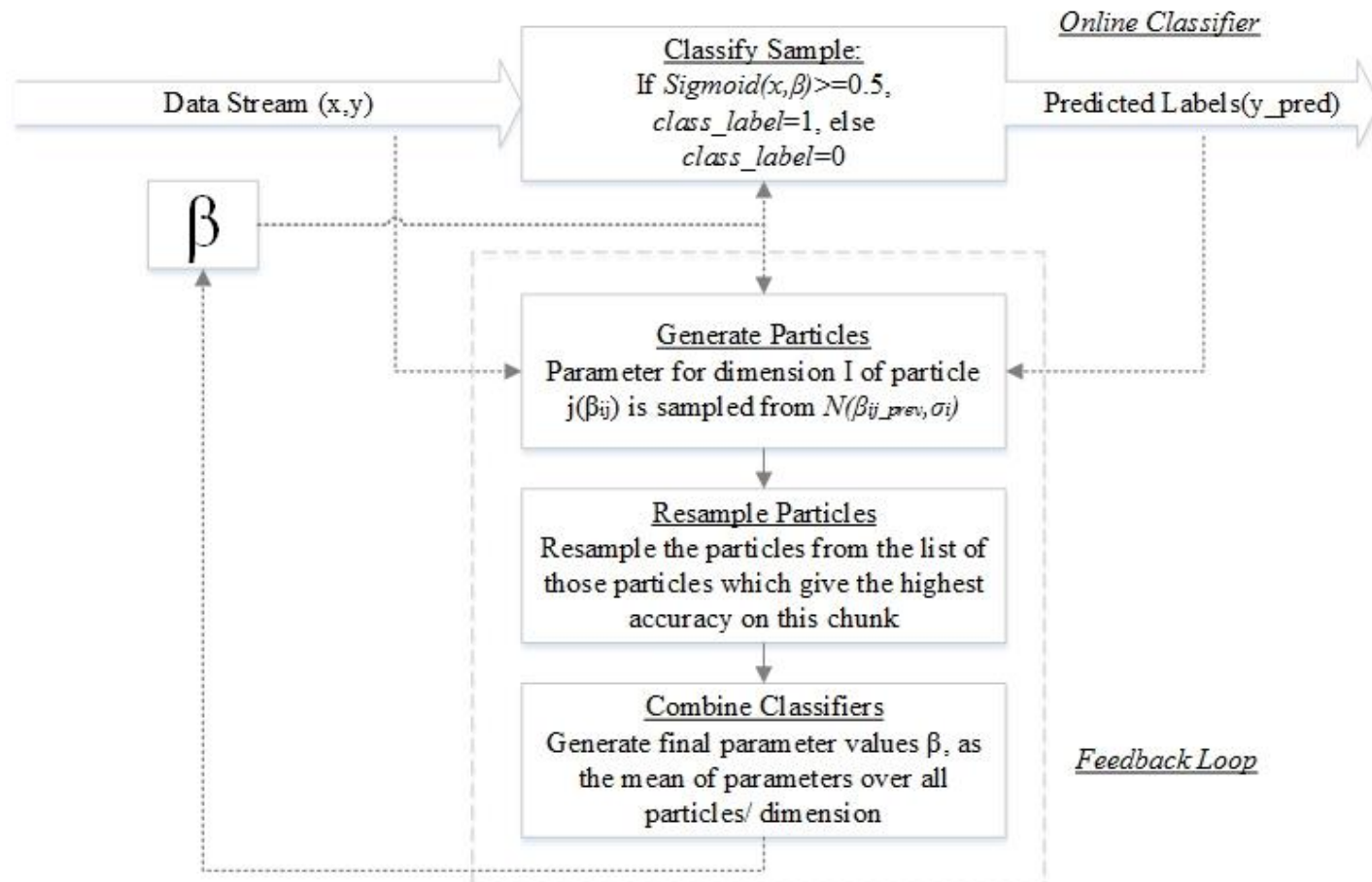
# Streaming Data and Concept Drift



**Concept Drift:**  $P_t(y|x_i) \neq P_{t+1}(y|x_i)$ .

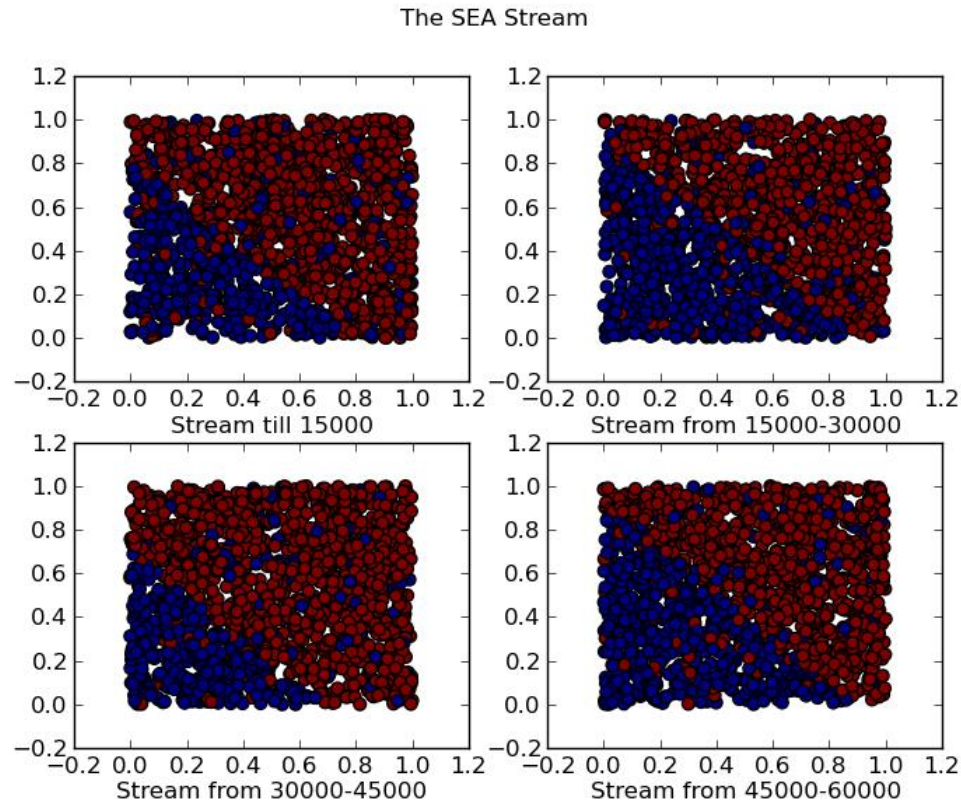
# Particle Filtering for Stream Classification

## PF\_LR Dynamic Classifier



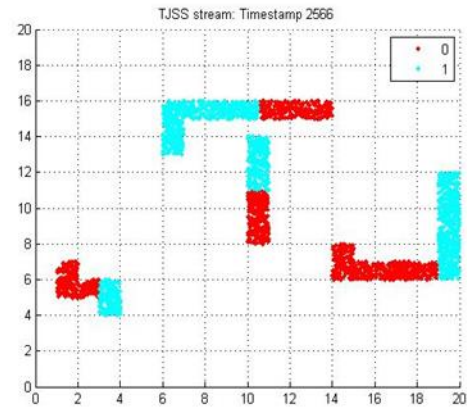
# Experimentation : Datasets Used

## > SEA Stream:



# Experimentation : Datasets Used

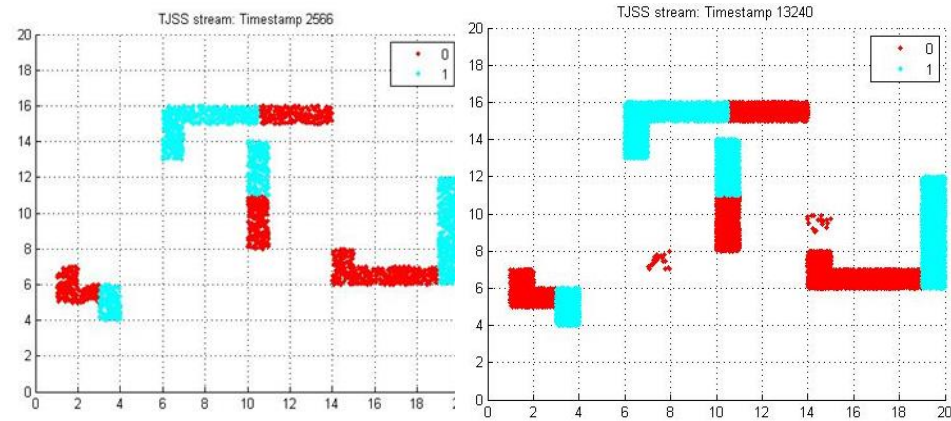
> TJSS Stream:





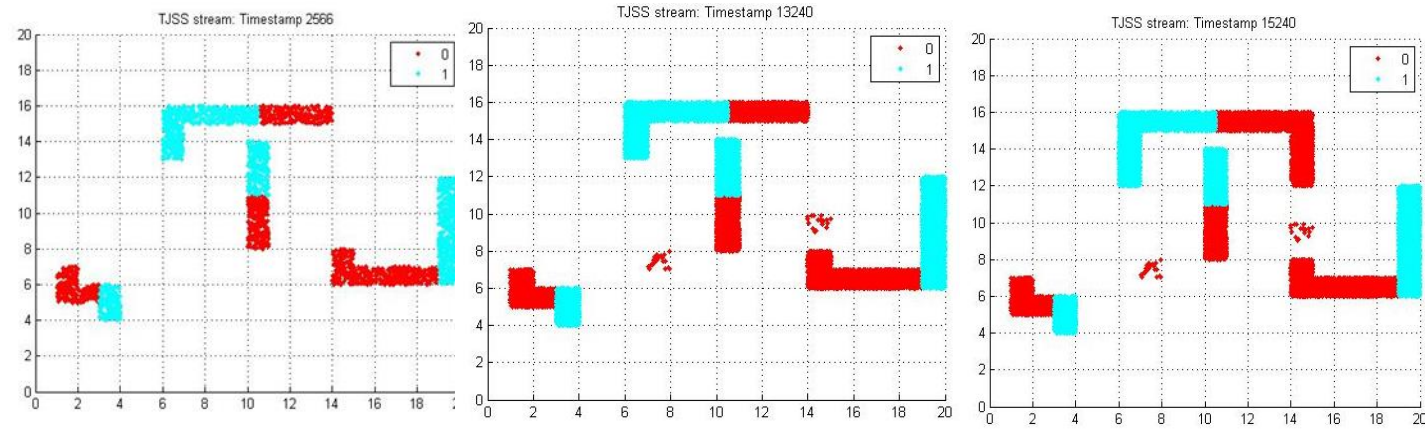
# Experimentation : Datasets Used

> TJSS Stream:



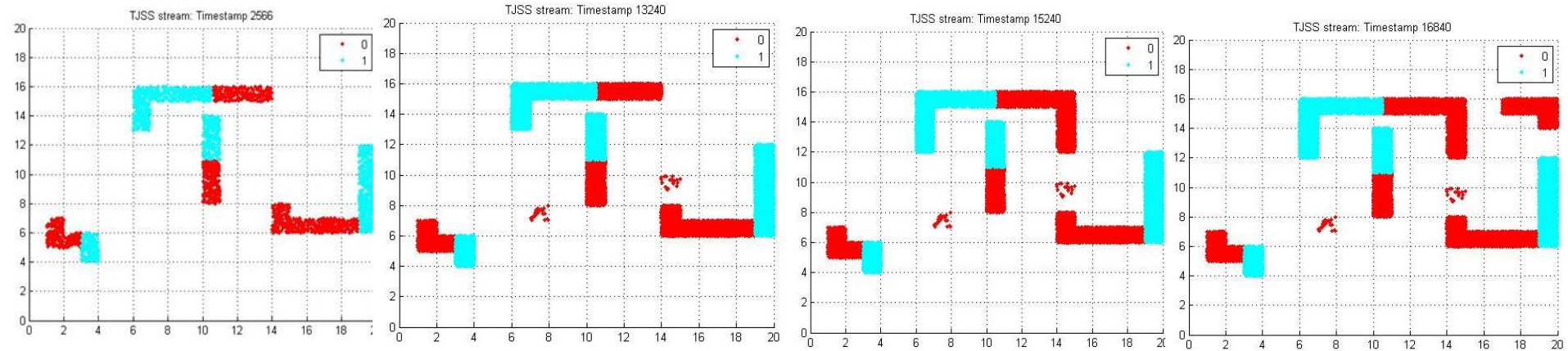
# Experimentation : Datasets Used

> TJSS Stream:



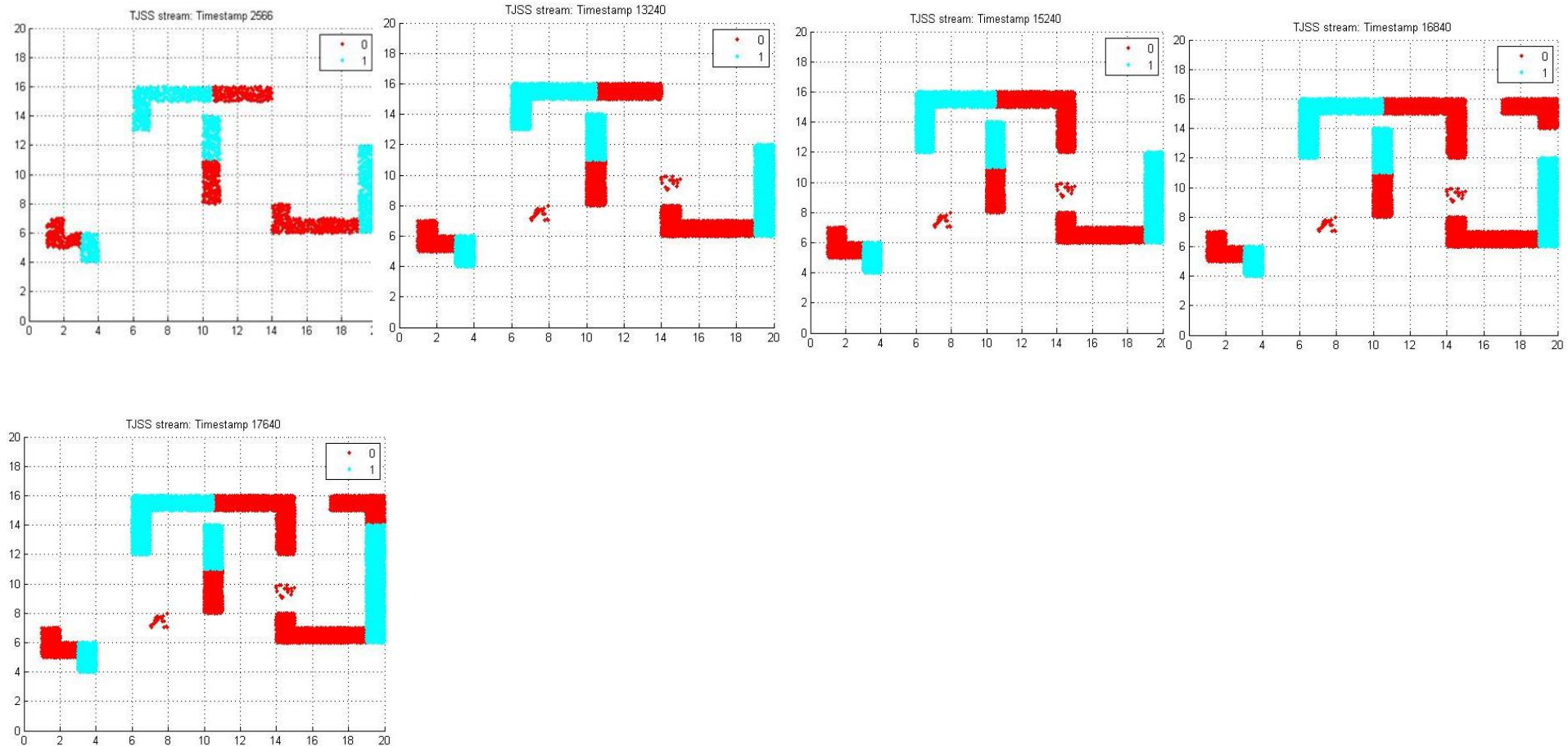
# Experimentation : Datasets Used

> TJSS Stream:



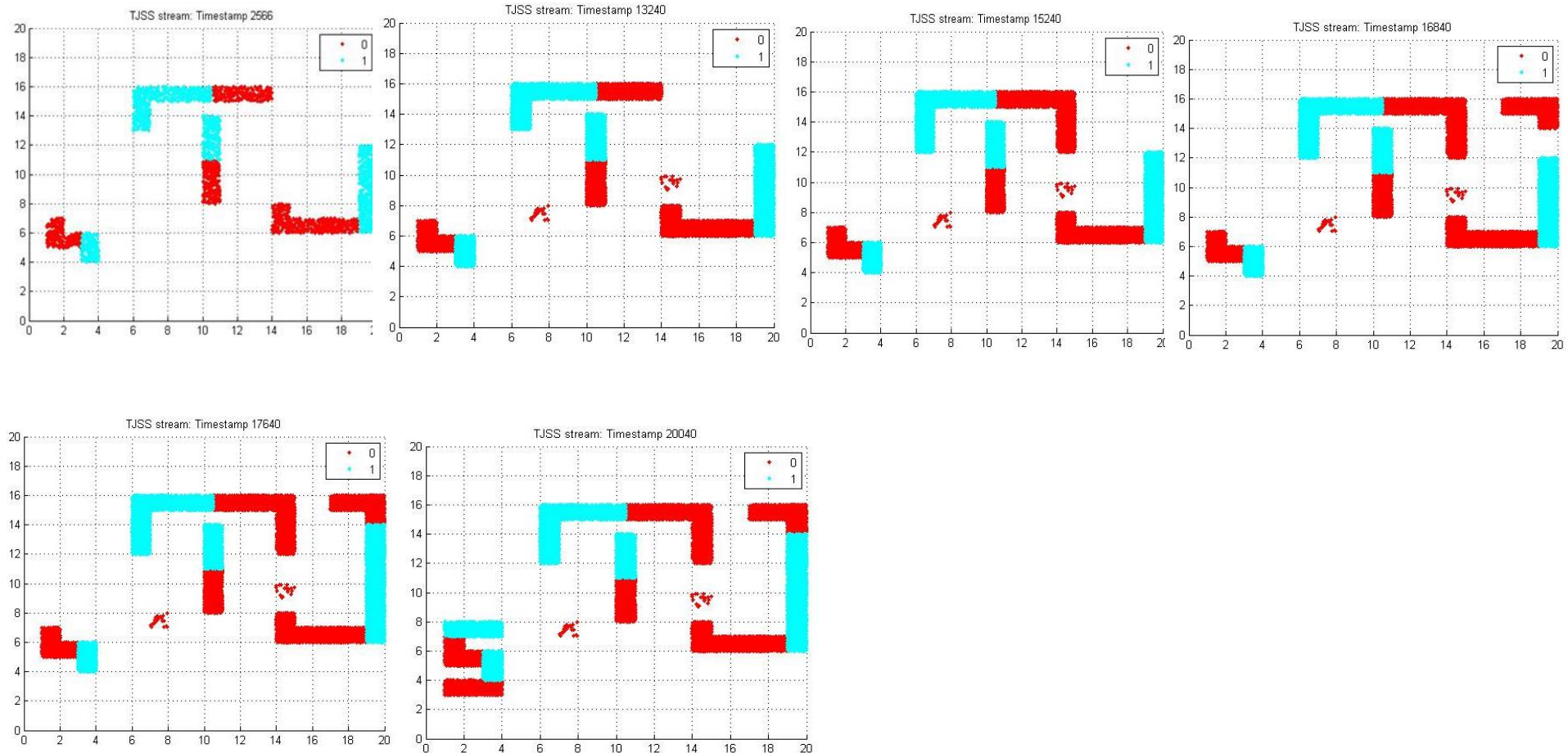
# Experimentation : Datasets Used

> TJSS Stream:



# Experimentation : Datasets Used

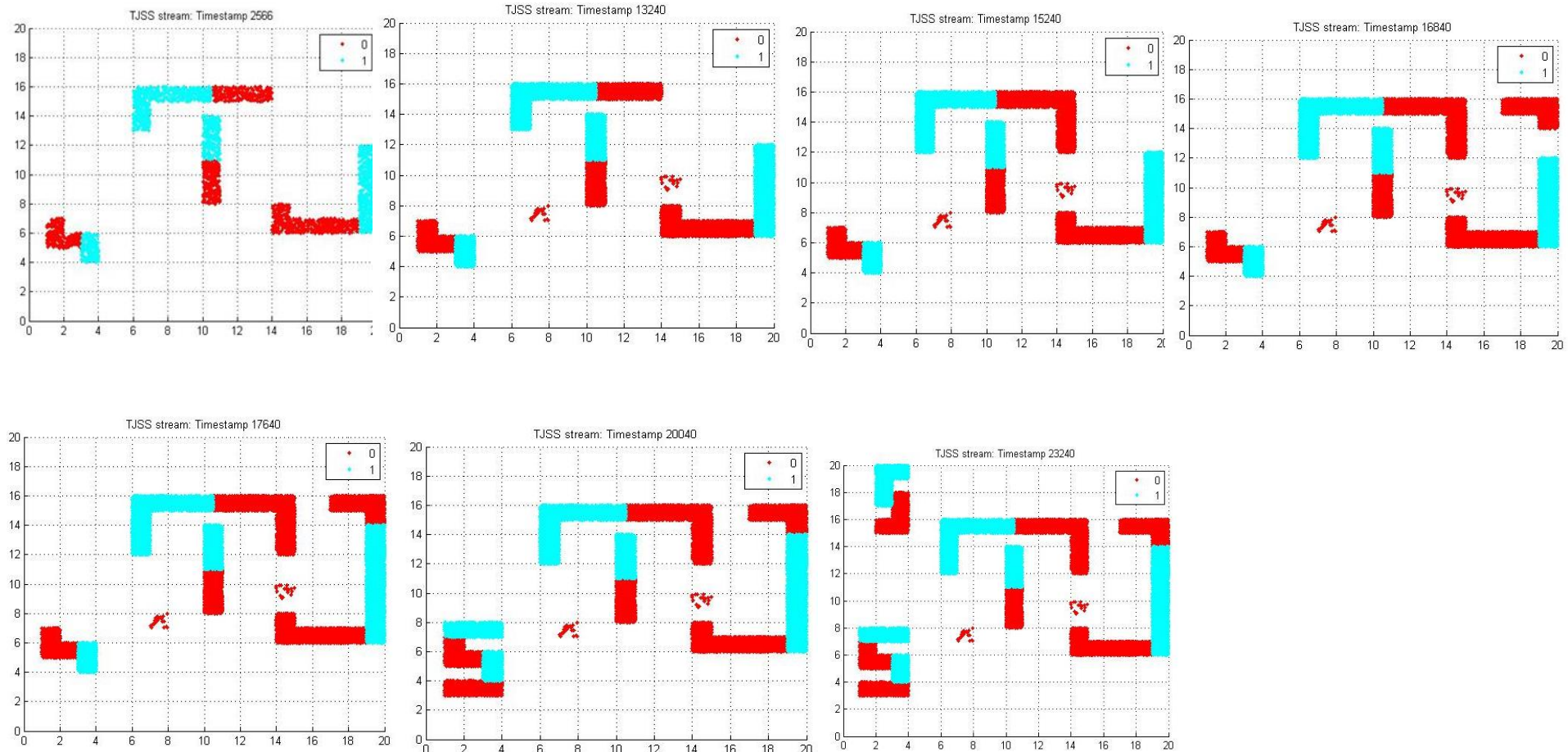
> TJSS Stream:





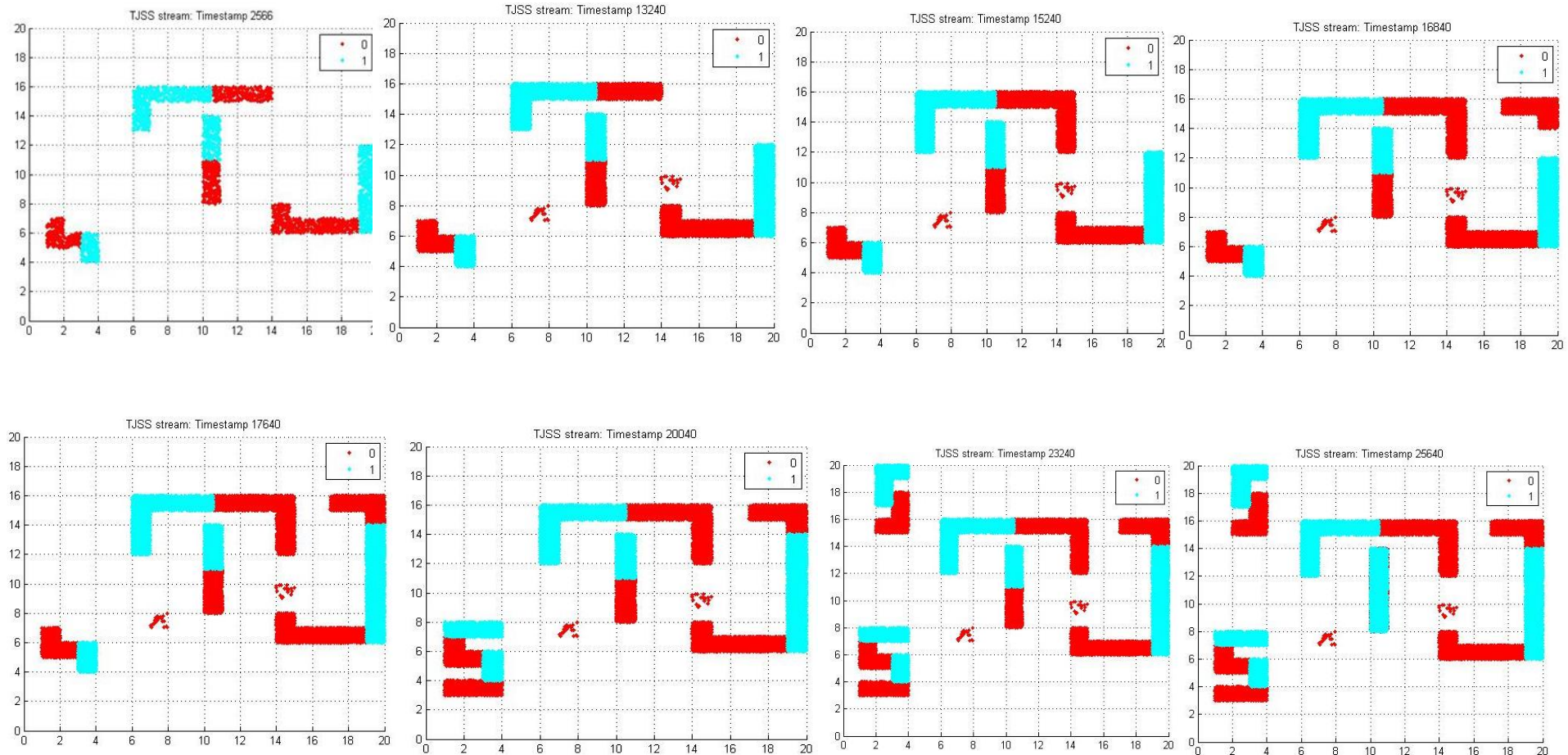
# Experimentation : Datasets Used

> TJSS Stream:



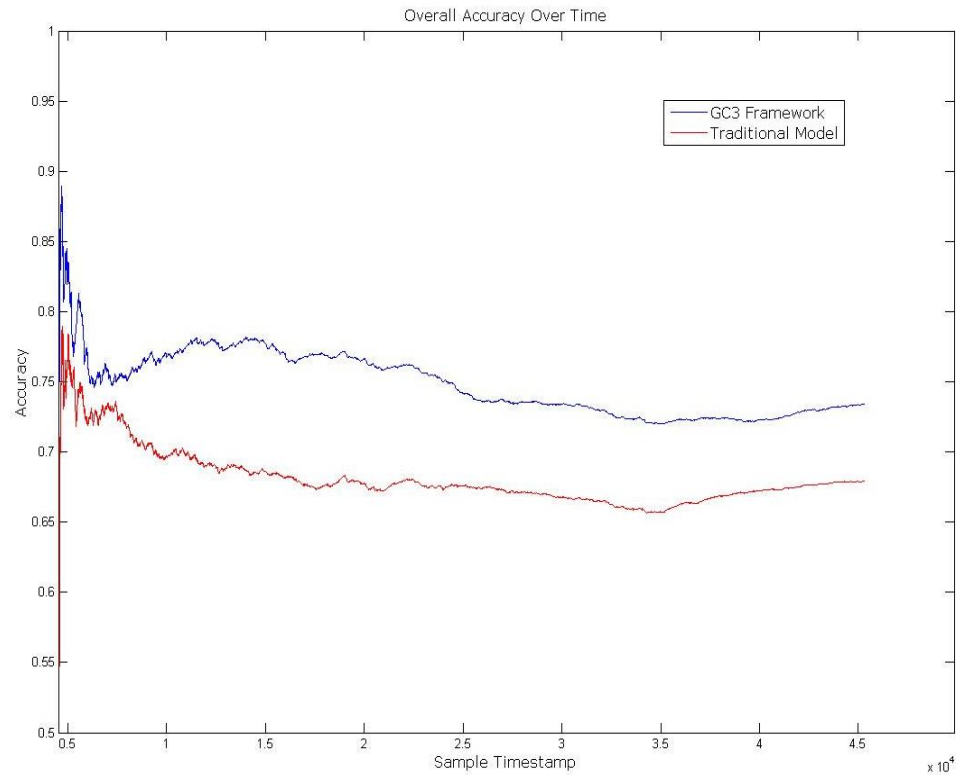
# Experimentation : Datasets Used

> TJSS Stream:



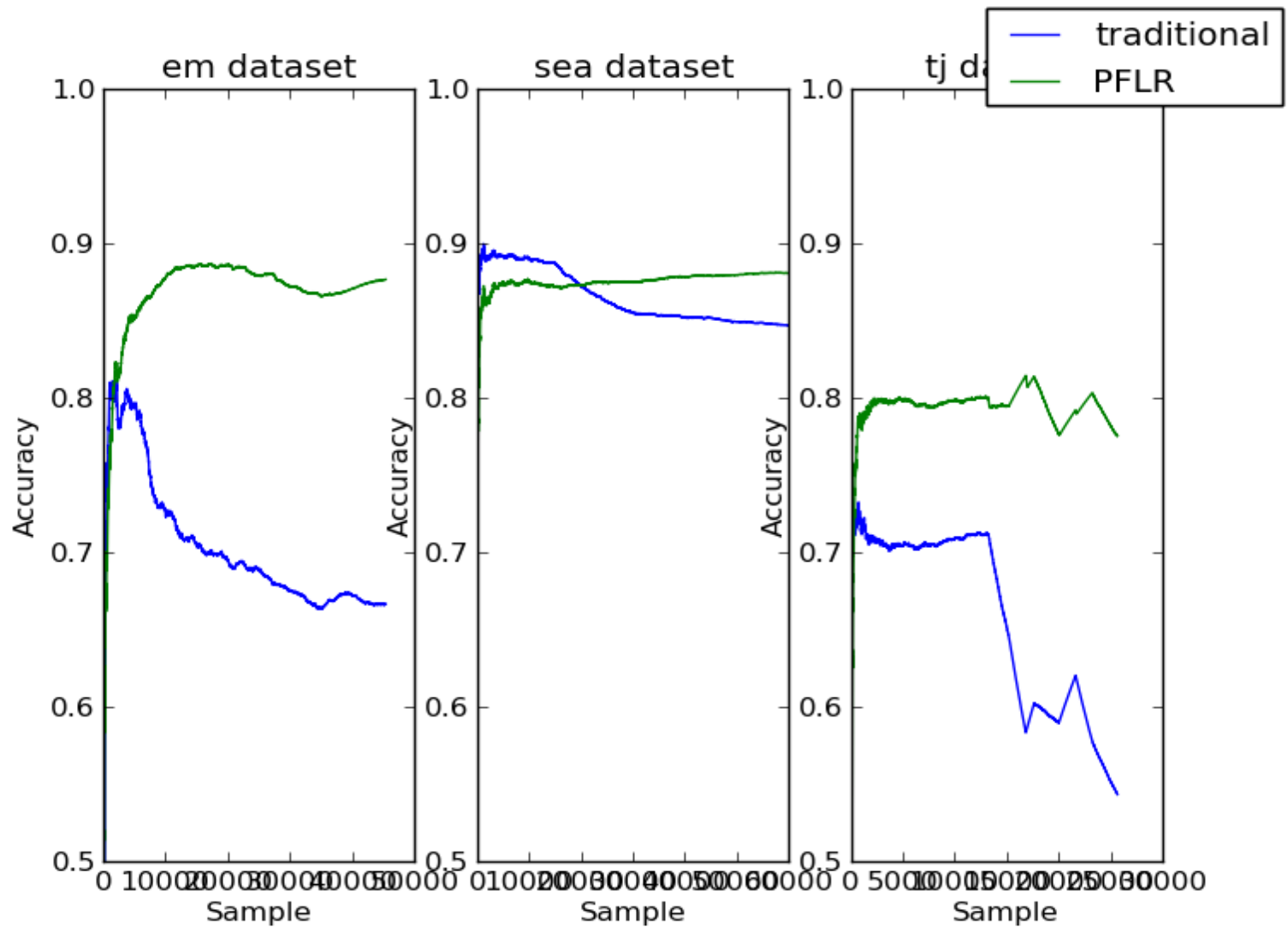
# Experimentation : Datasets Used

> EM Stream:

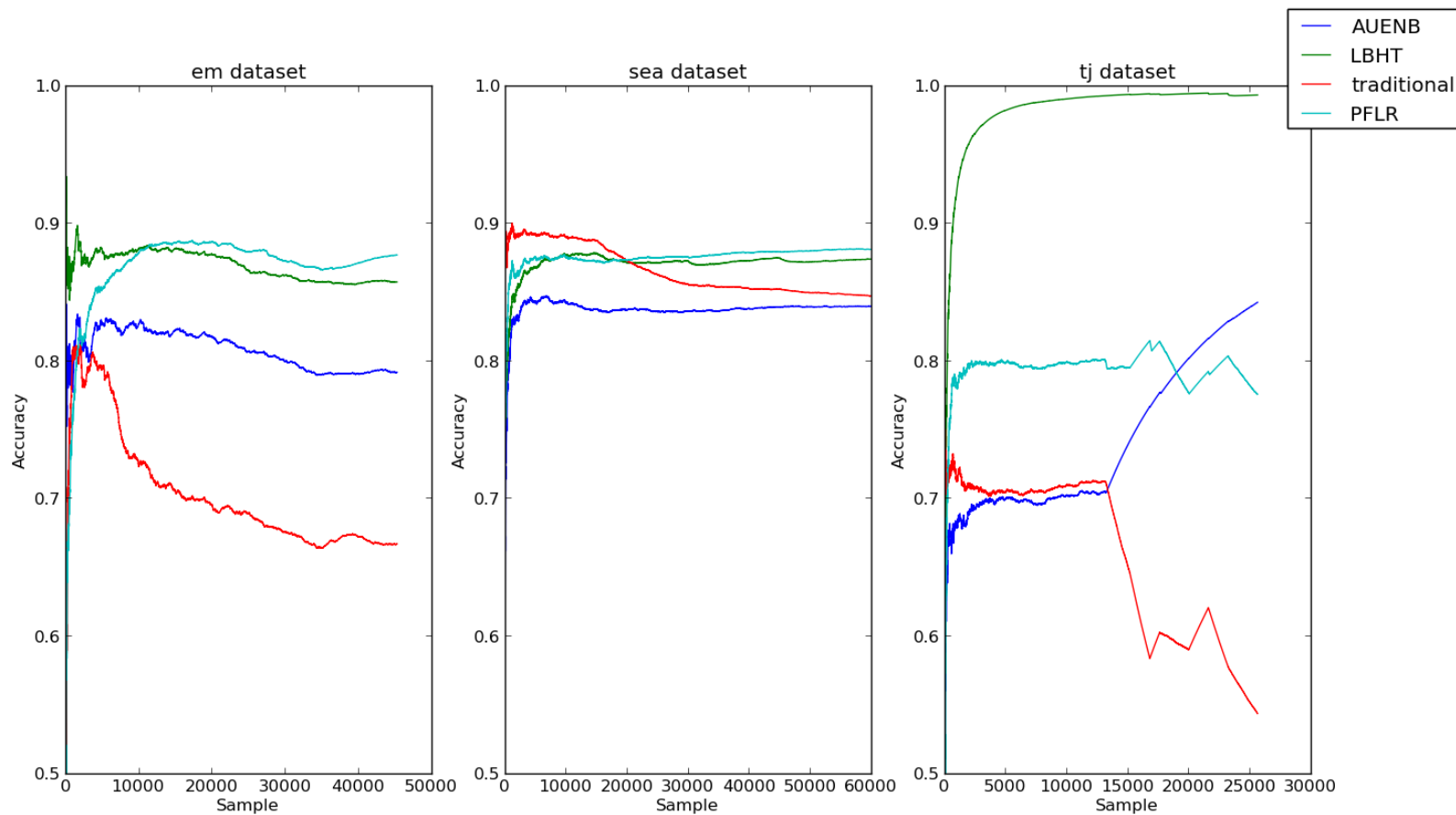




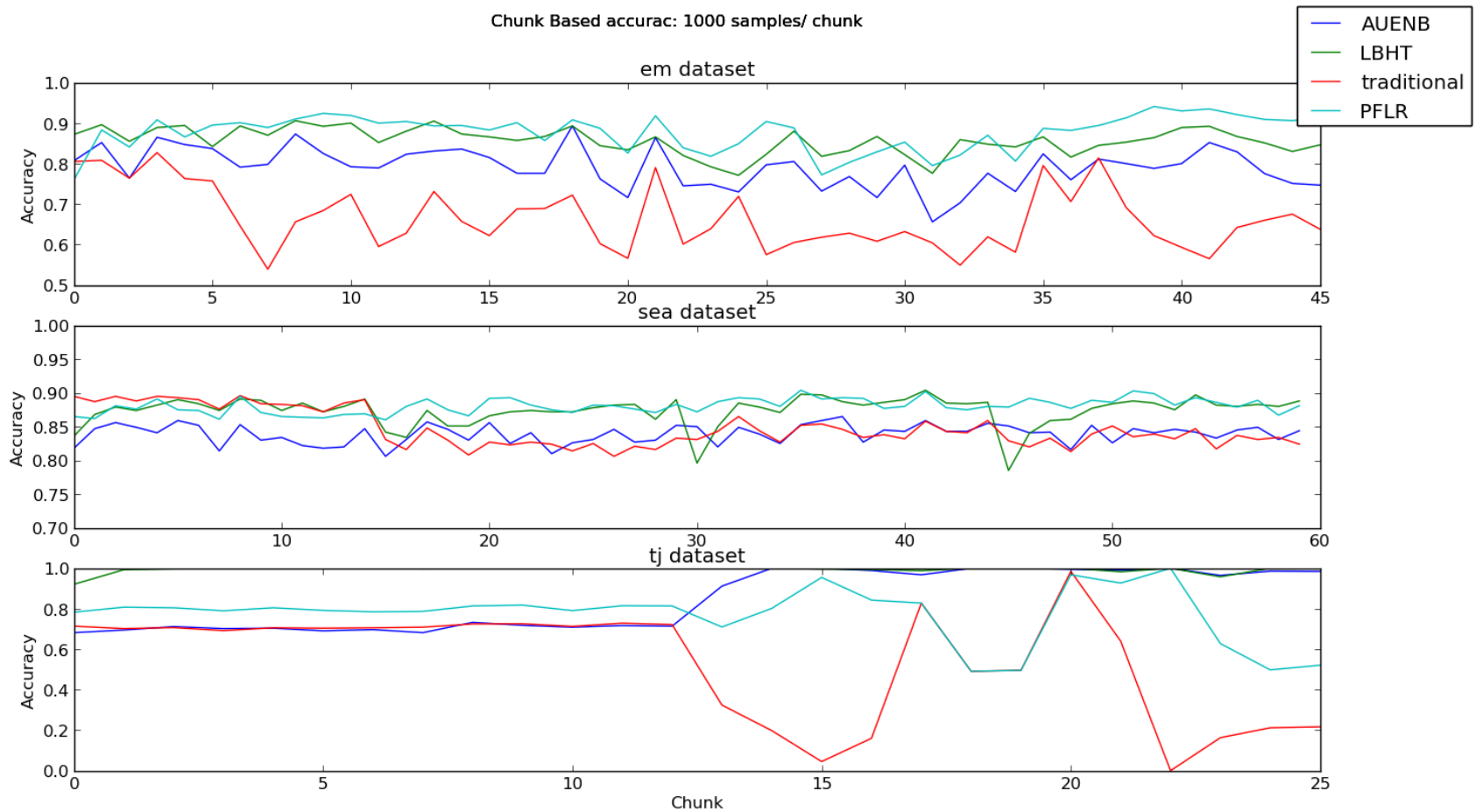
# Experimentation : Results



# Experimentation : Results

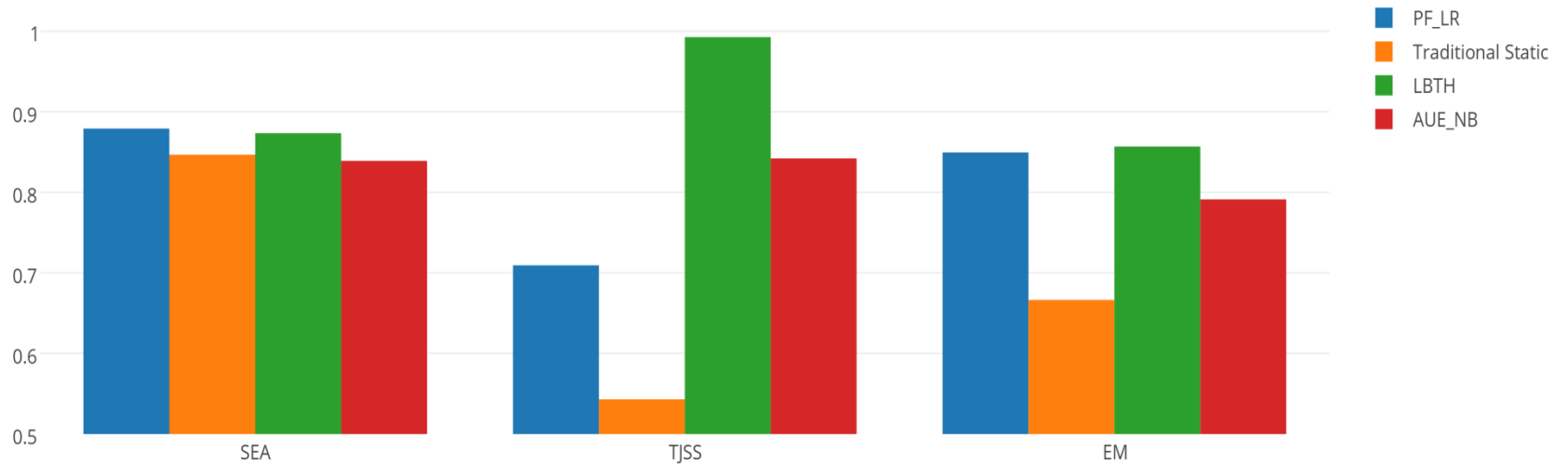


# Experimentation : Results

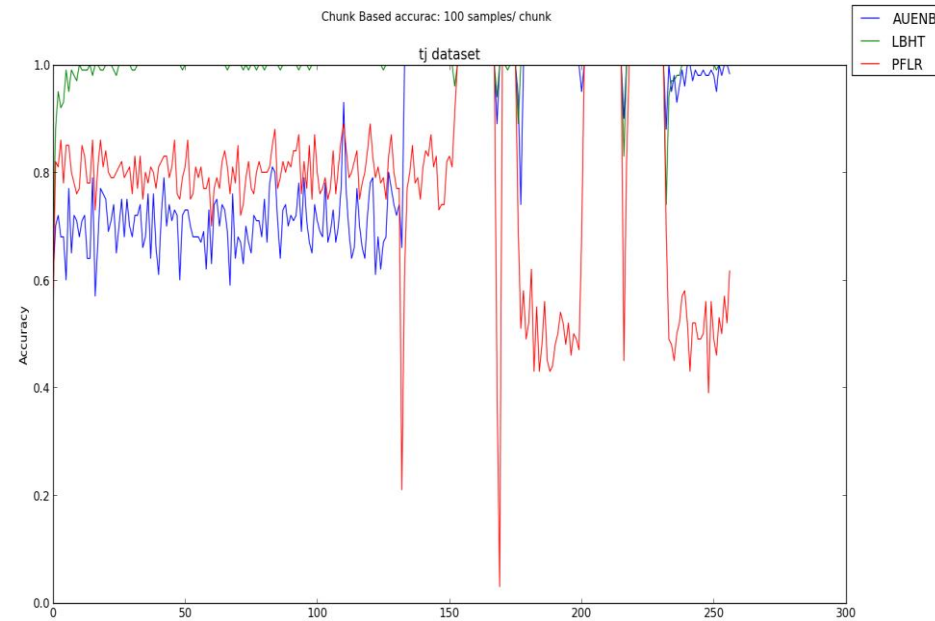
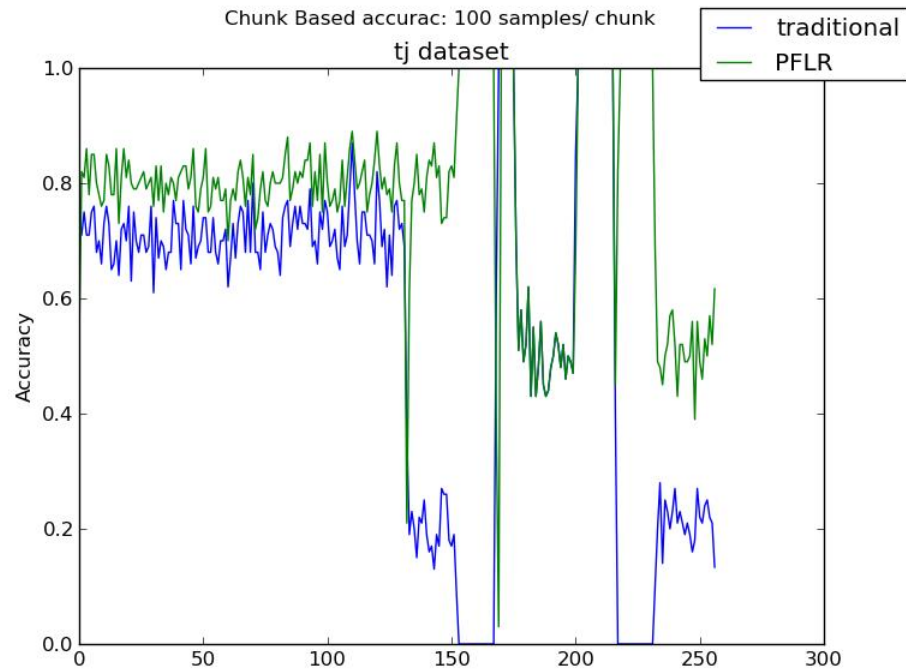


# Experimentation : Results

Accuracy Comparison

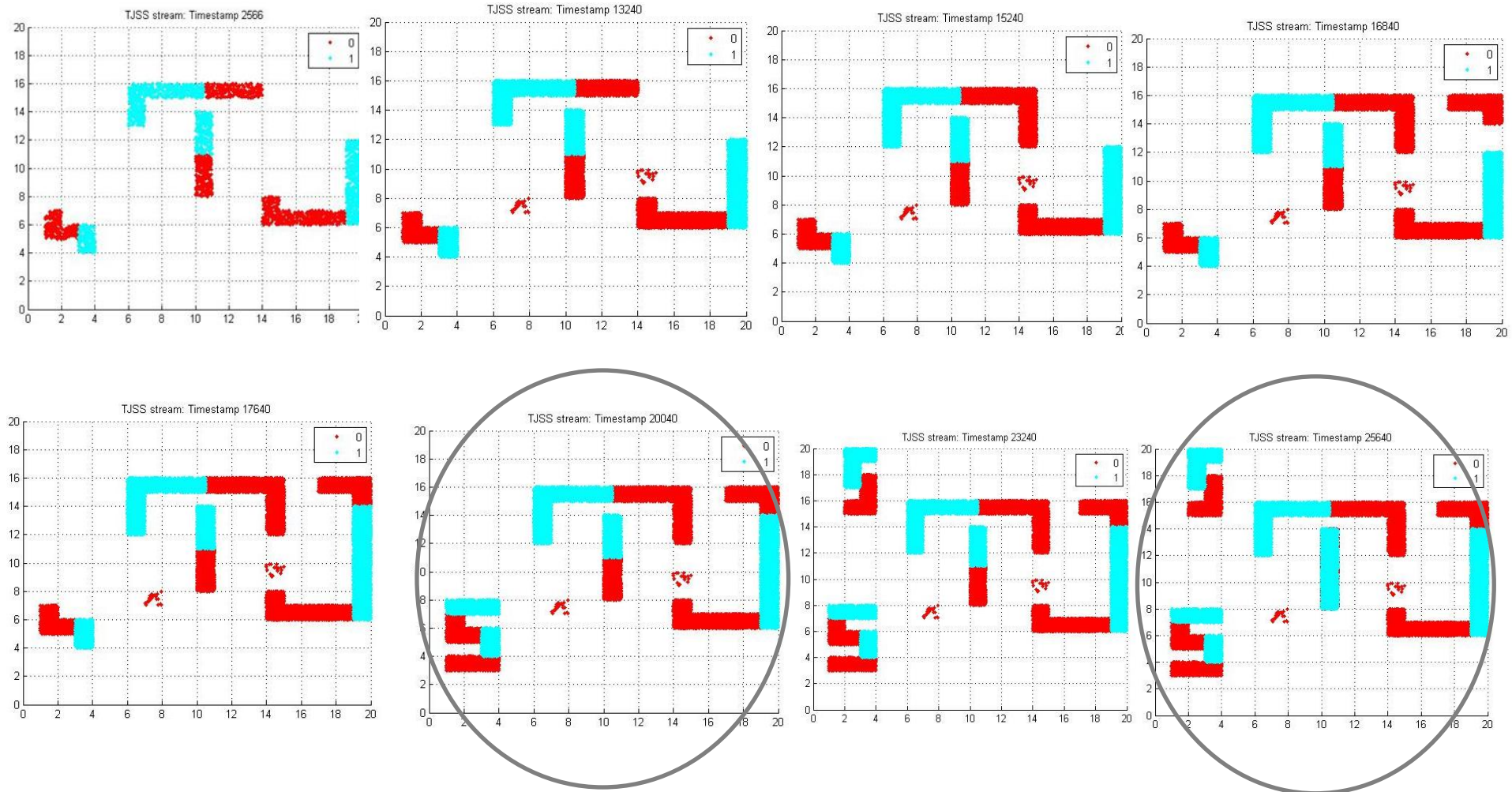


# Experimentation : Analysis



# Experimentation : Analysis

> TJSS Stream:



## Conclusion

- PF can handle drifts in streaming data
- Good performance on EM stream— Robustness
- Difficulty detecting local drifts
- Linear time  $O(MN)$ , no retraining needed

ANY  
QUESTIONS  
?



תודה  
Dankie Gracias  
Спасибо شُكراً  
Merci Takk  
Köszönjük Terima kasih  
Grazie Dziękujemy Děkojame  
Ďakujeme Vielen Dank Paldies  
Kiitos Täname teid 谢谢  
**Thank You** Tak  
感謝您 Obrigado Teşekkür Ederiz  
감사합니다  
Σας ευχαριστούμε  
Бодхон  
Bedankt Děkuje vám  
ありがとうございます  
Tack

<https://github.com/tegjyotsingh/Incremental-Classification>