

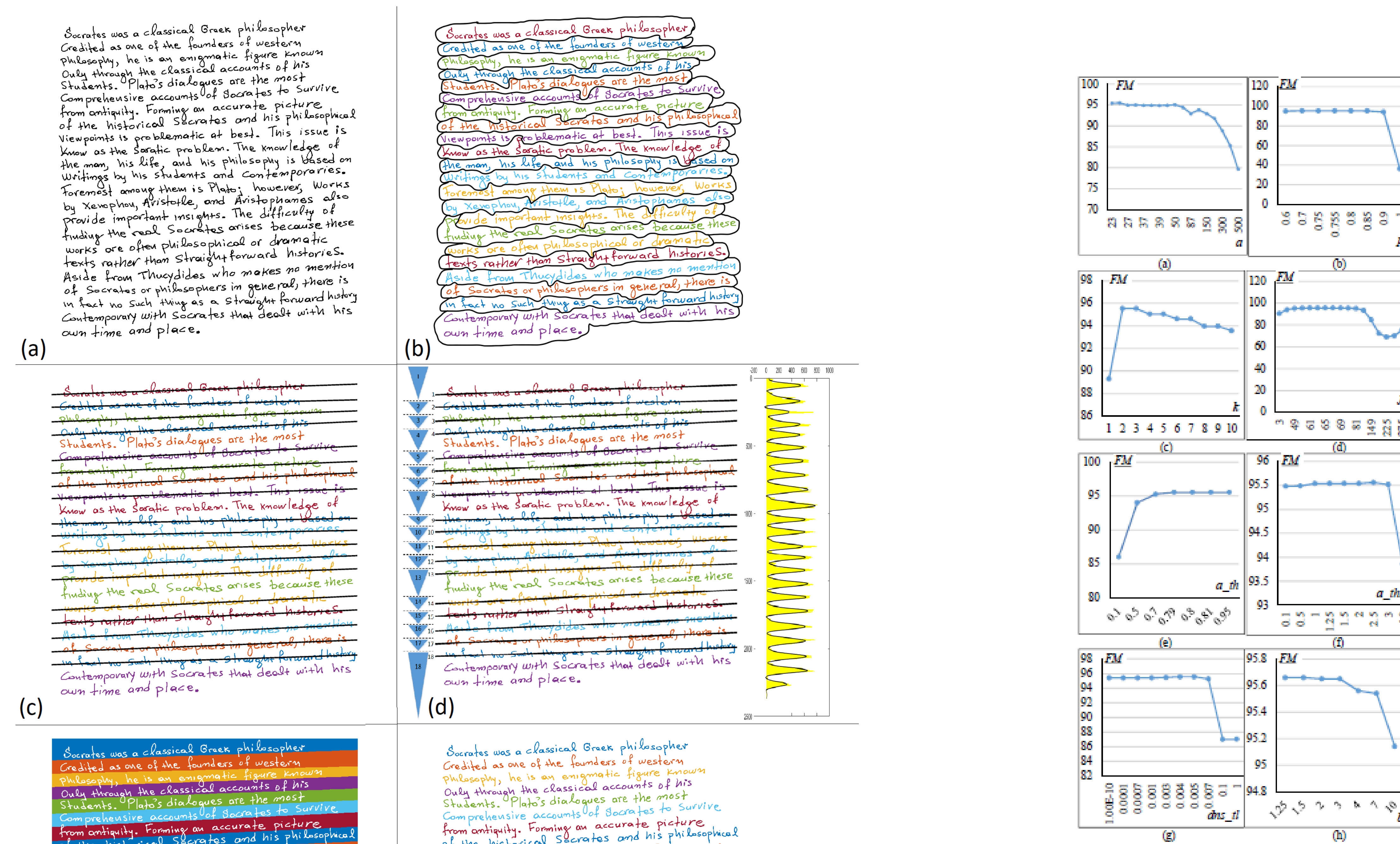
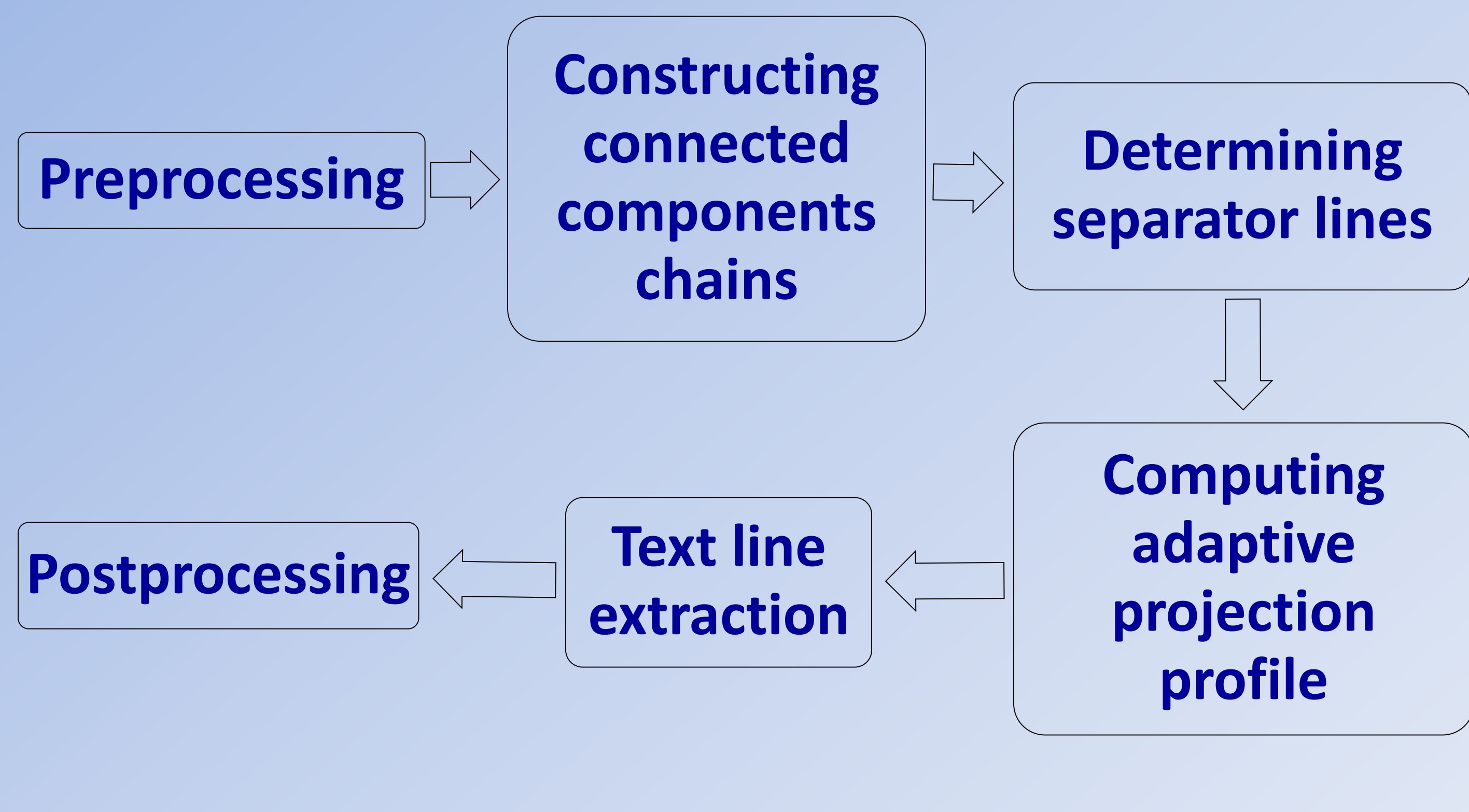
## Context of the work

- Handwritten text line extraction is one of the major problems in document image analysis.
- Handwritten documents commonly include multi-skewed text lines, different inter-line distances and touching text lines.
- In this paper, a hybrid method based on the combination of grouping and projection profile approach for text line extraction from handwritten document is proposed.

## Objective of the work

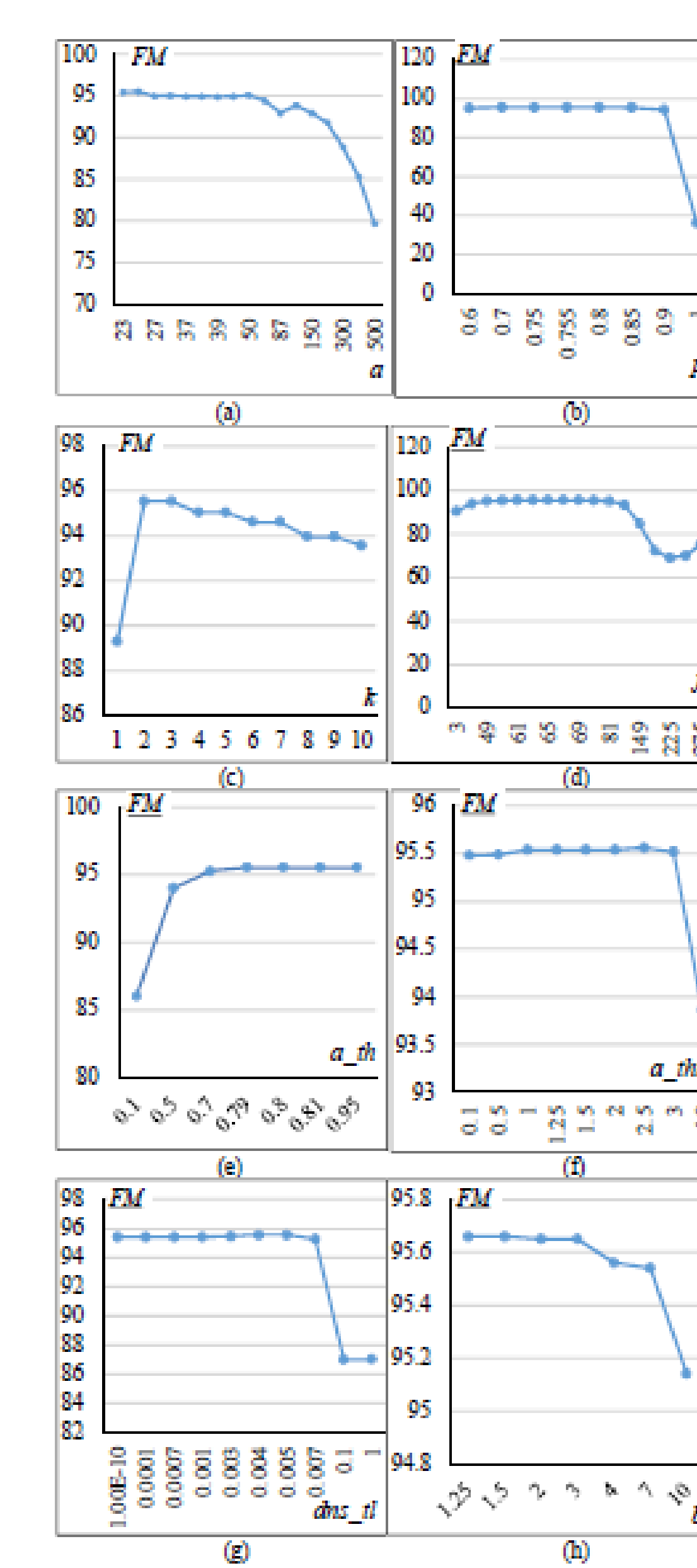
- Design a fast and precise method to extract handwritten text lines
- Propose an adaptive projection profile analysis
- Introduce a new inter-word distance measure in document images

## Block Diagram of the Proposed Method



(a) a sample binary handwritten document image, (b) primary connected component grouping for text line path detection, (c) selected text line paths to calculate adaptive projection profile, (d) text line paths with travelling range for each one and calculated projection profile, (e) extracted text lines using the projection profile coming with some failures in high connected components, (f) the final detected text lines.

Text line segmentation results (FM) obtained from the experiments on the train dataset based on different values for the parameters.



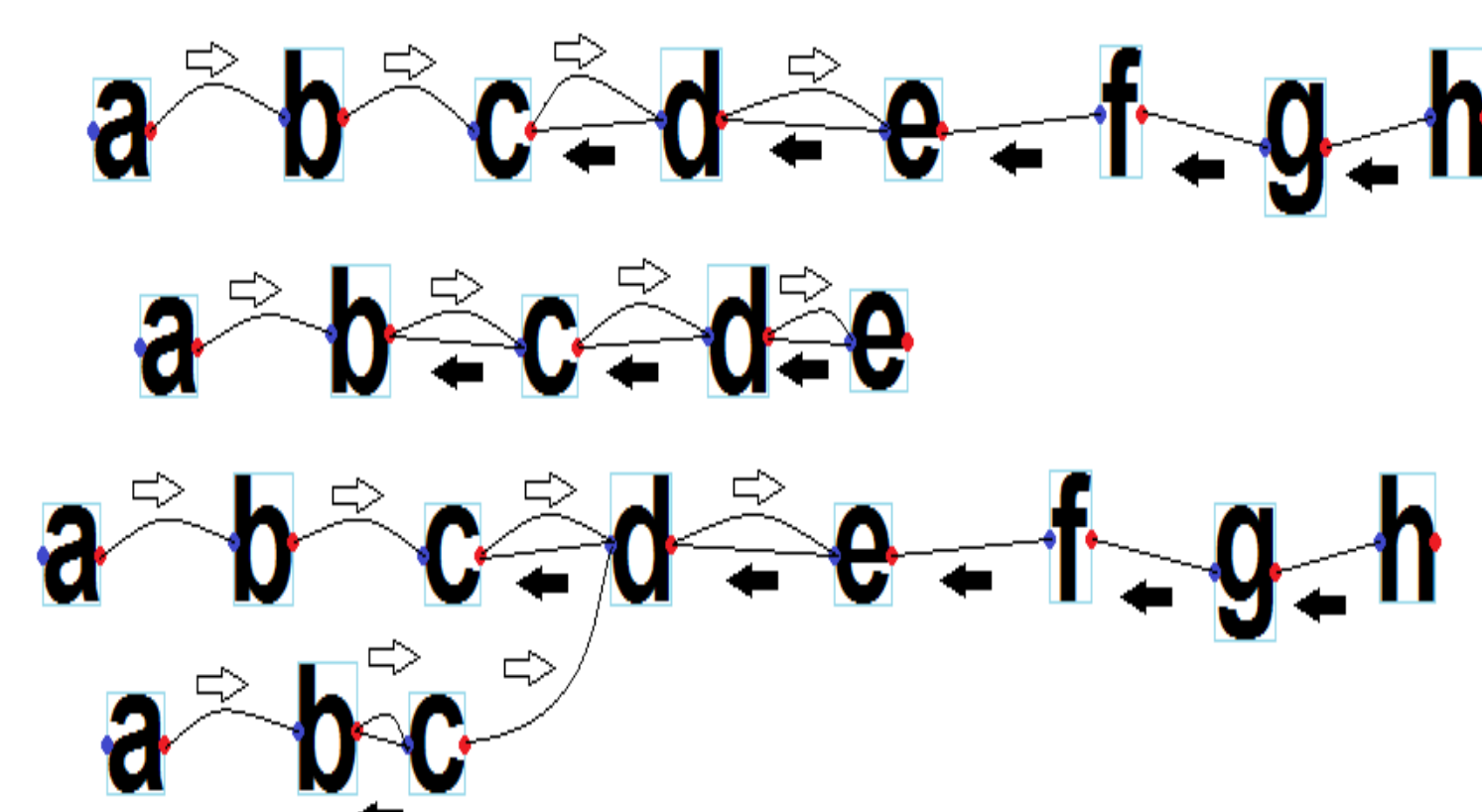
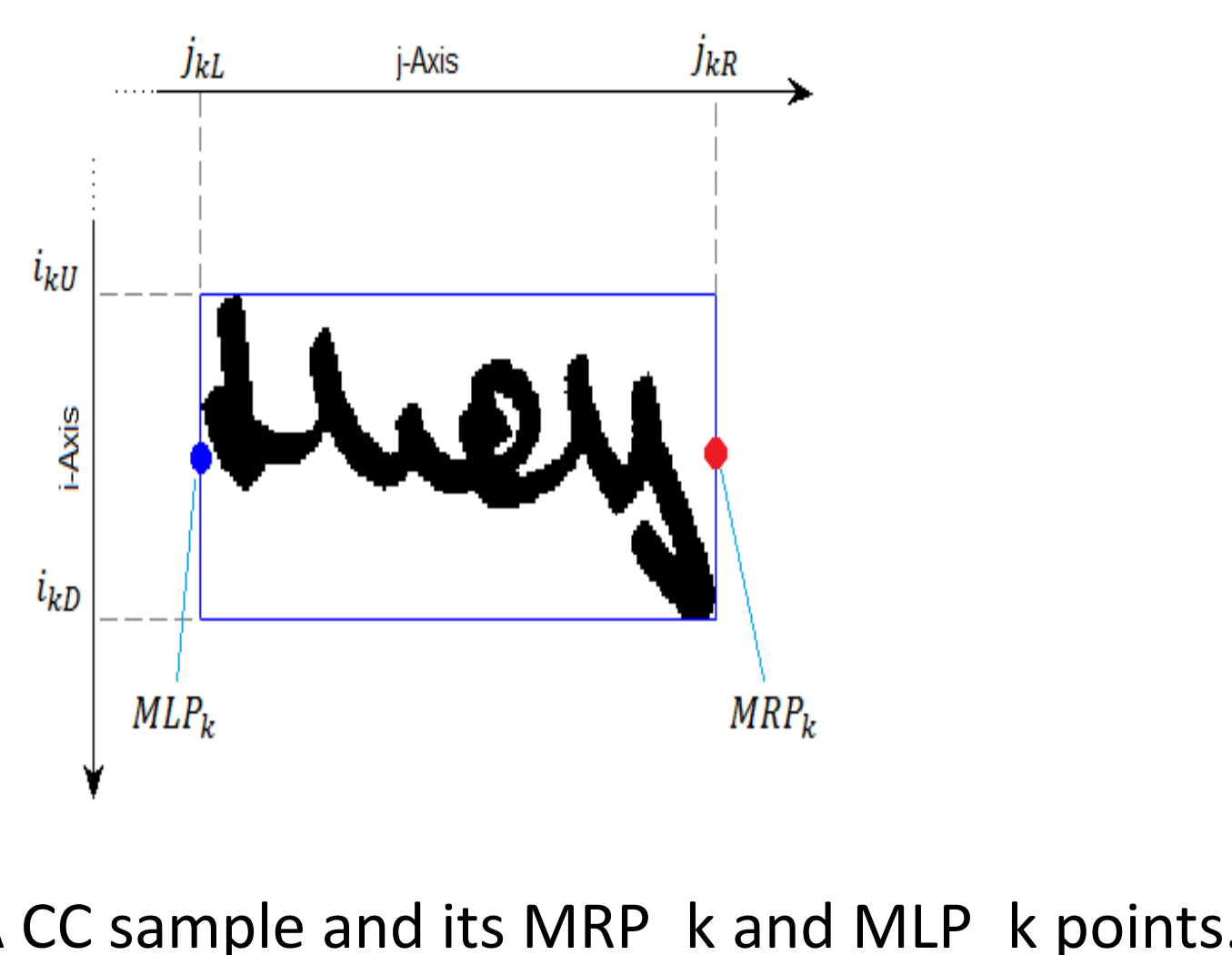
Comparison of the results obtained from the proposed method with some of the results reported in [13]

	Metric	M	$\alpha_{2\sigma}$	DR (%)	RA (%)	FM (%)
Method						
MSHK		2696	2428	91.66	90.06	90.85
QATAR-a		2626	2404	90.75	91.55	91.15
CVC		2715	2418	91.28	89.06	90.16
NCSR (SoA)		2646	2447	92.37	92.48	92.43
ILSP (SoA)		2685	2546	96.11	94.82	95.46
<b>Proposed Method</b>		<b>2652</b>	<b>2553</b>	<b>96.37</b>	<b>96.26</b>	<b>96.32</b>

Sample results of the tested document images written in (a) English, (b) Bangla, and (c) Greek.

## Conclusions and Future work

- In this paper, a new method for text line extraction in handwritten document images is presented.
- Introducing a new distance measure for CC grouping
- Presenting an adaptive projection profile
- Achieving a comparable performance with a low computation
- In future, we plan to investigate on designing a way to achieve more precise separator lines proposing a more efficient method to assign unusual connected components (very small and large) to the text line that they actually belong.



CCs and their determined bounding box, the most right and left points and the route of each text line.