



# Manga Drawing Style Recommendation System

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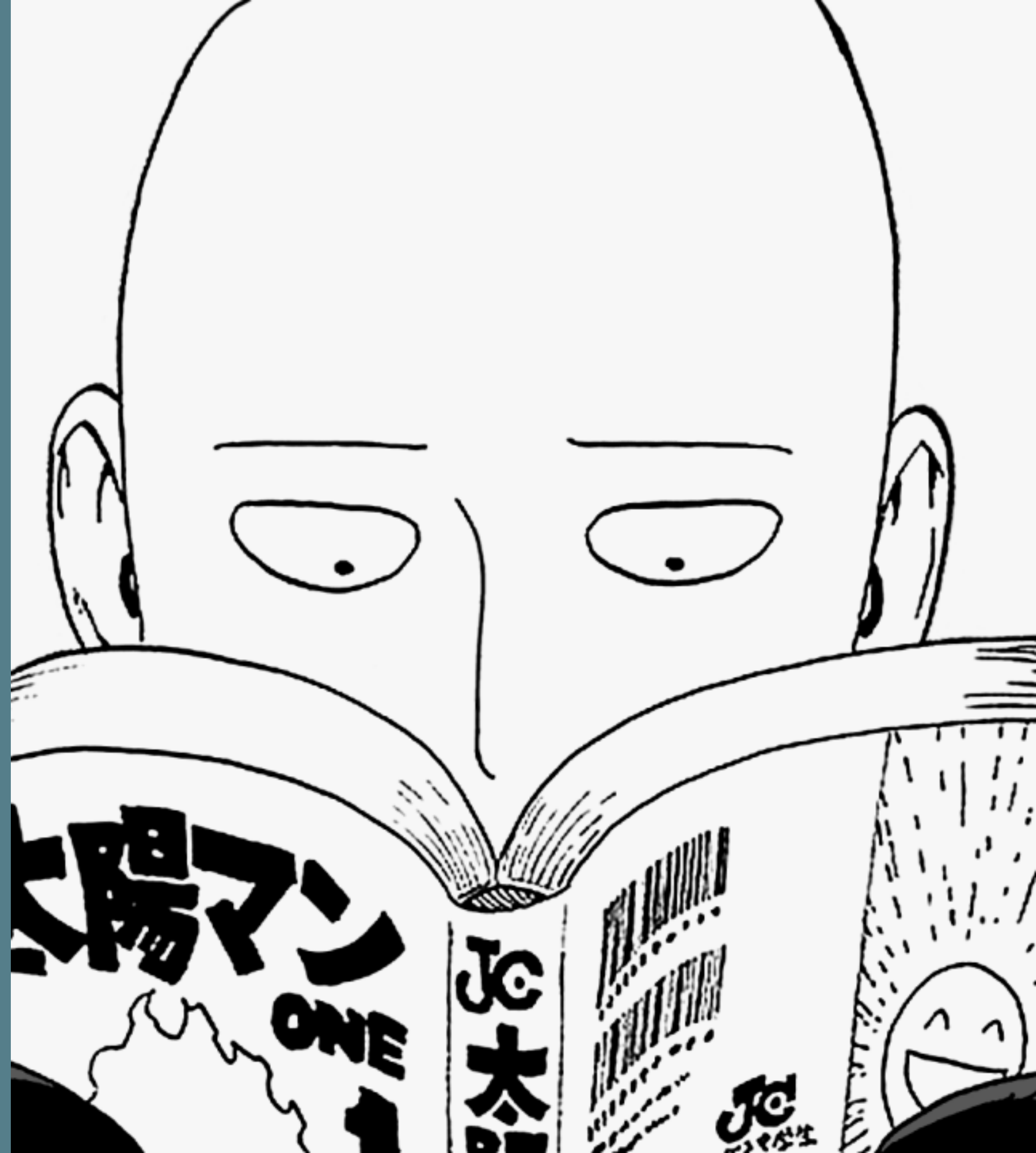




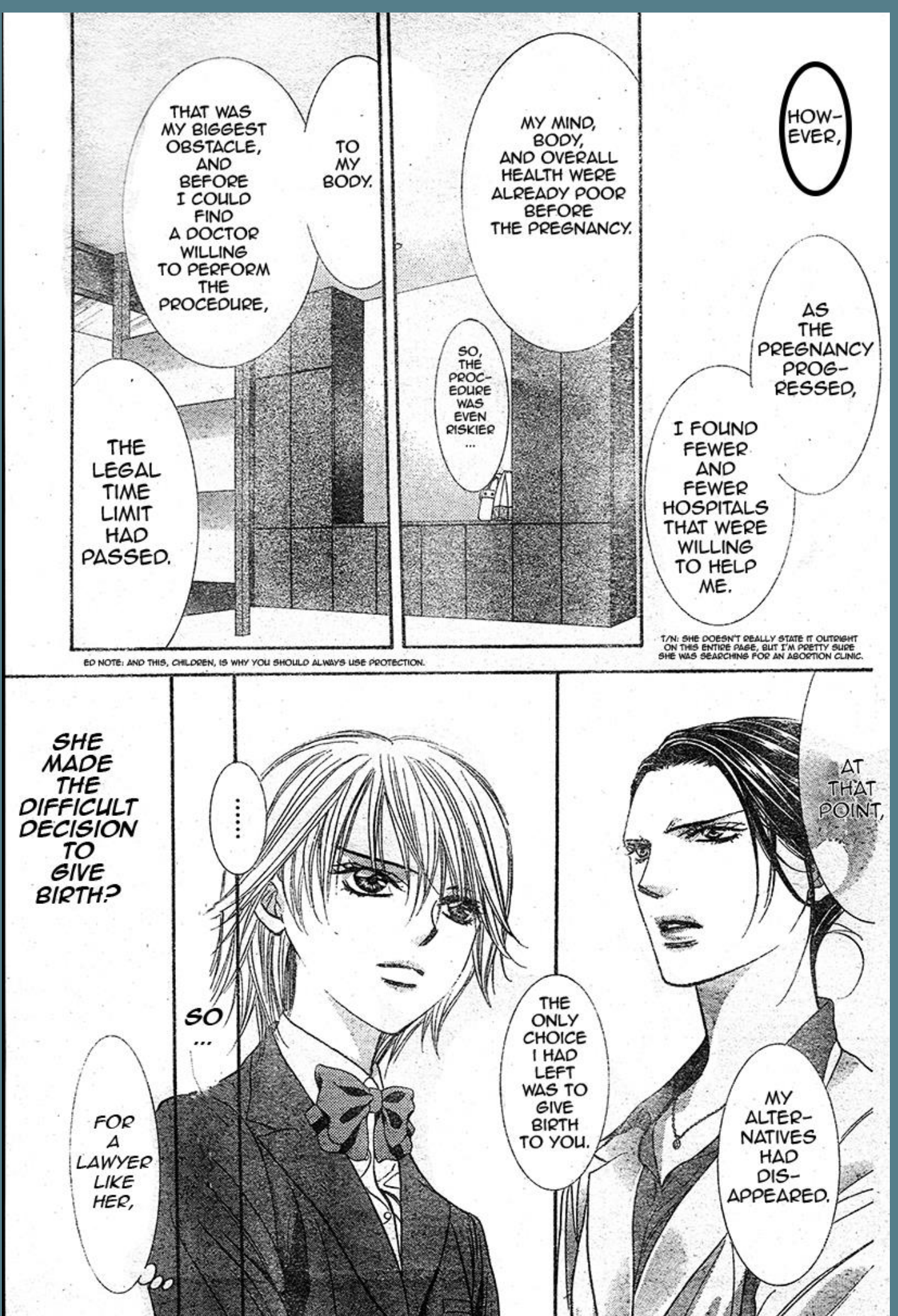
# Manga

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**WORLD  
WAR II**













Dataset

# Manga109

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- Compiled at University of Tokyo  東京大学  
THE UNIVERSITY OF TOKYO
- For the use in academic research on the media processing of Japanese Manga

# Data set Preprocessing



# Scene Detection



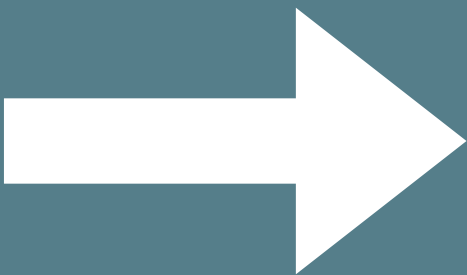


# Scene Extraction I





# Scene Extraction II





# Japanese Text Extraction



- Text Location
- Text Segmentation
- Text Removing





# Face Extraction

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 **GitHub** `lbpcascade_animeface`

- Anime/Manga use
- Less than 5% false position





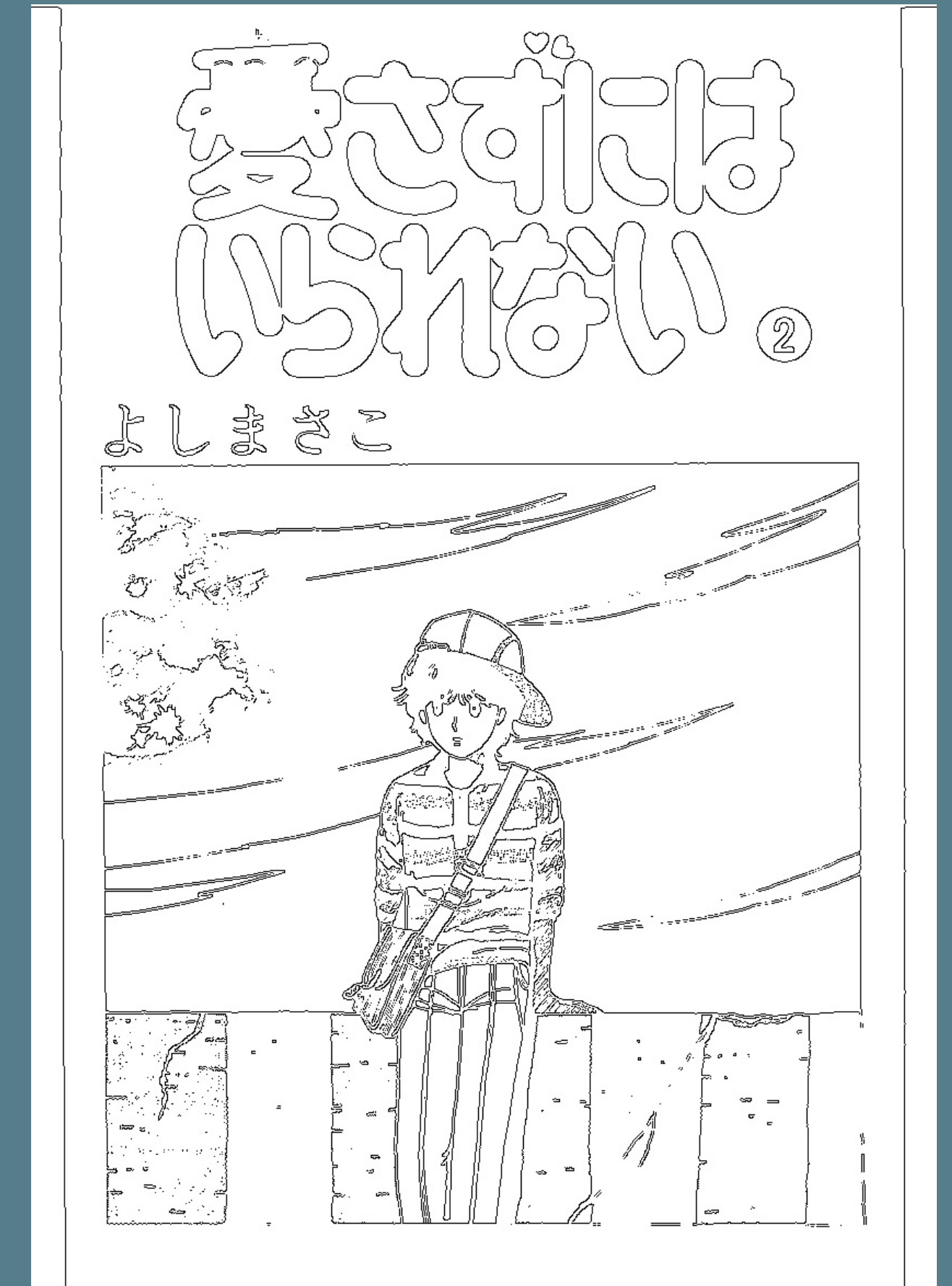
# Separation of Manga Line Drawing and Screen-tones



Original



Tone



Outline



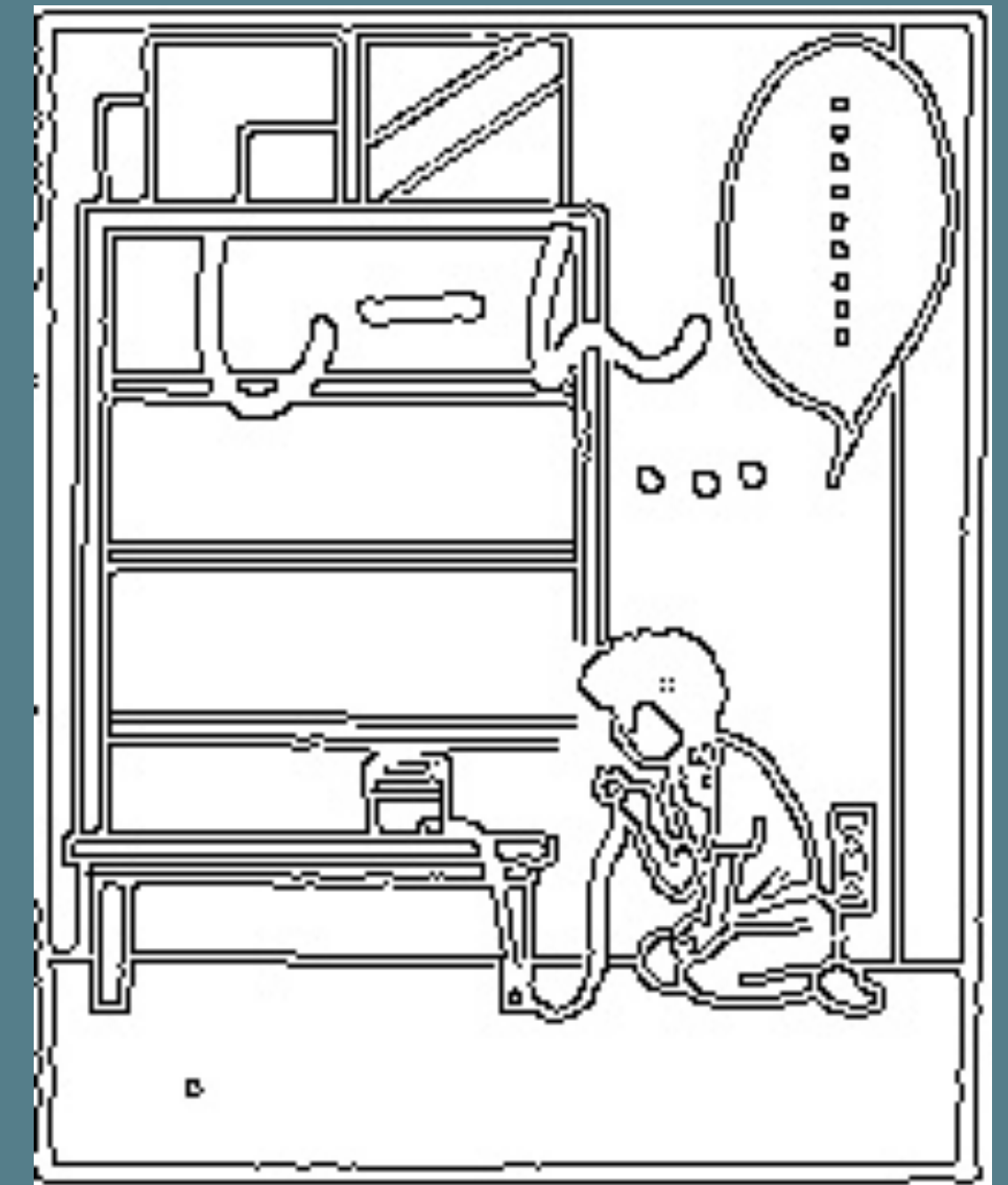
# Separation of Manga Line Drawing and Screen-tones



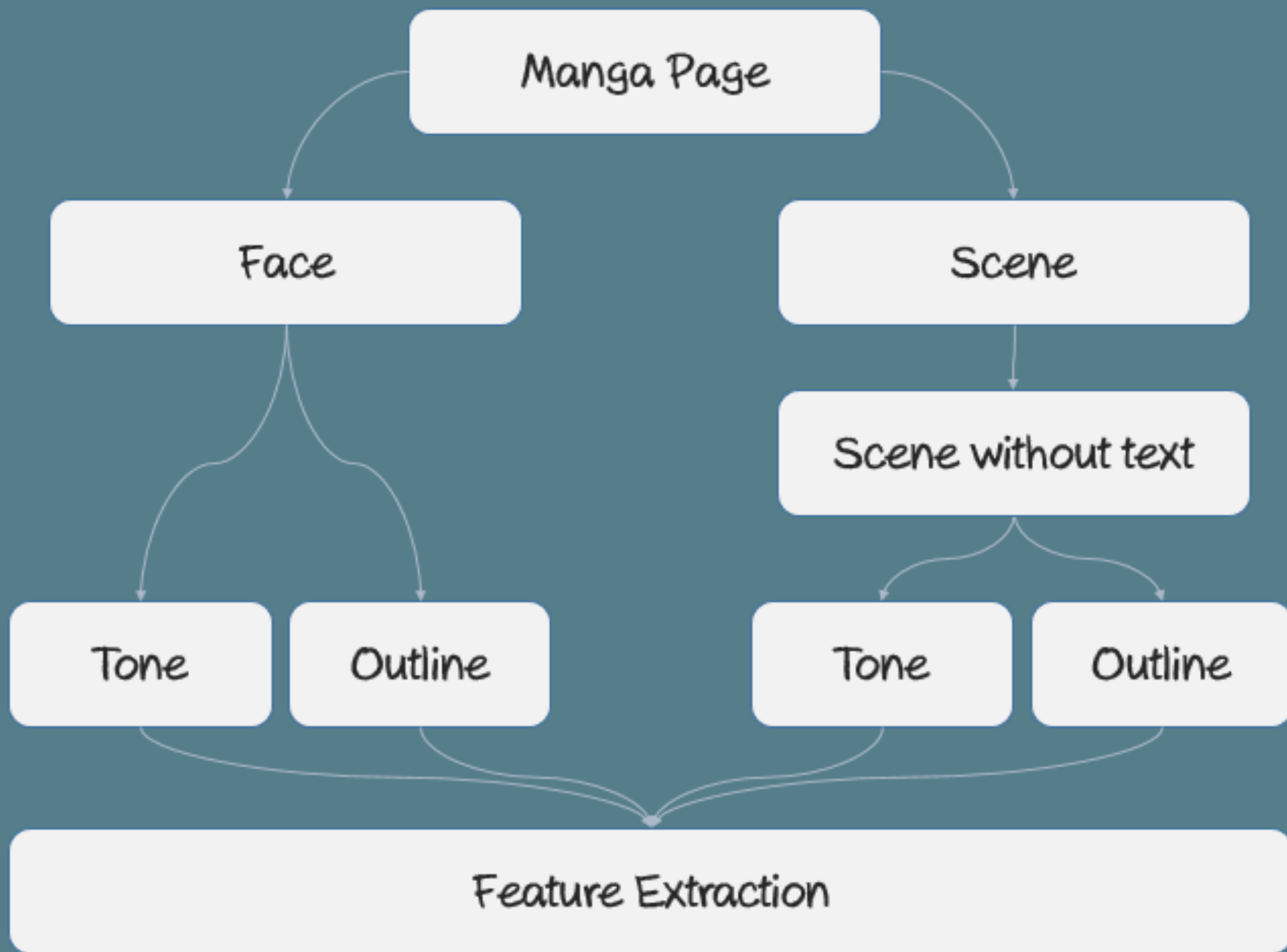
Original



Tone



Outline





# Feature Extraction



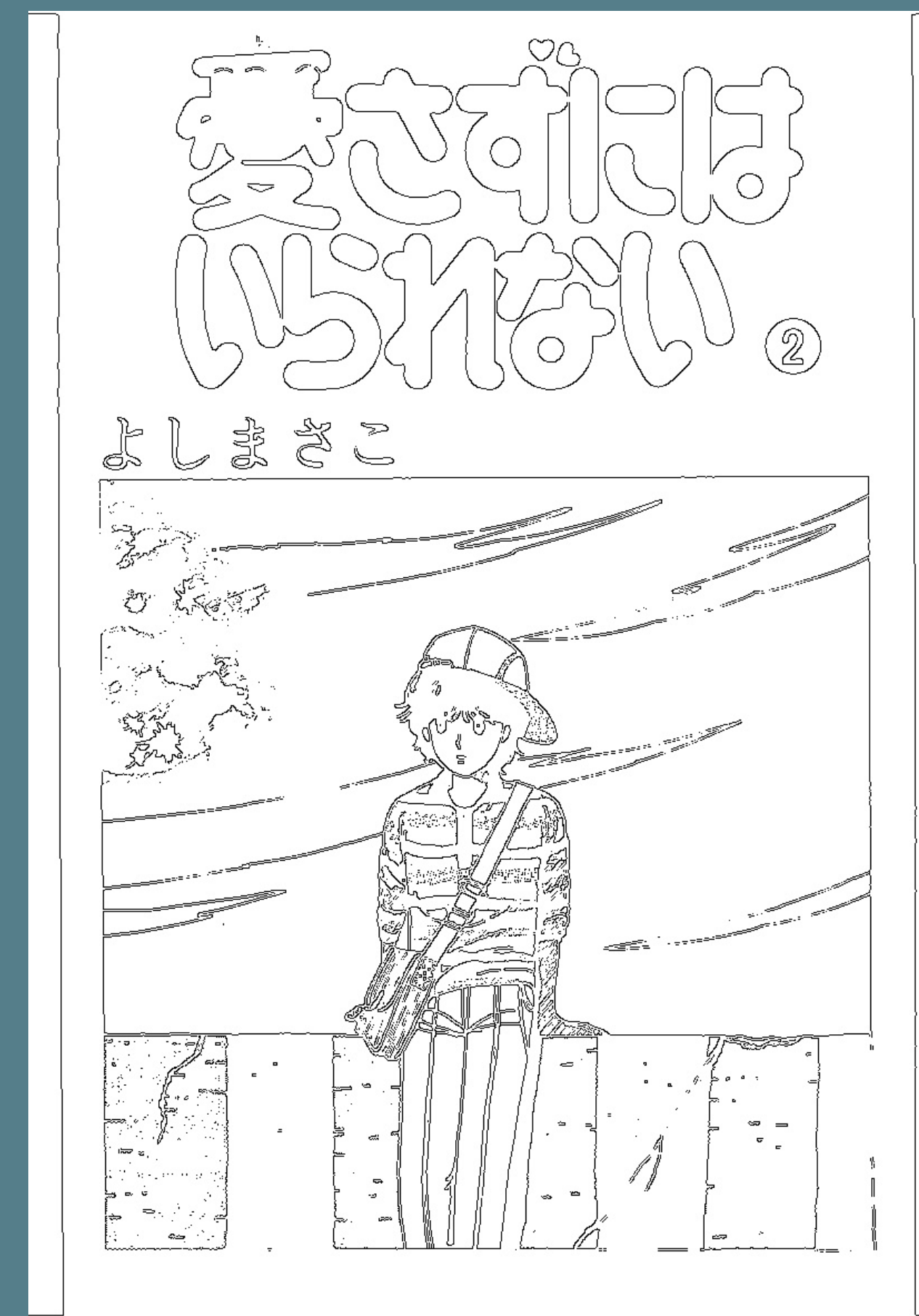
Feature Extraction

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graph TD; A[Feature Extraction] --> B[Scene Features]; A --> C[Face Features];
```

Scene Features

Face Features





Width

Height

Area

Slope

Tone Pixels

Outline Pixels

Outline Vectors

Color Gradient Groups

Outline to Tone ratio

Manga

Scene

Width

Height

Area

Slope

Tone  
Pixels

Outline  
Pixels

Outline  
Vectors

Outline to Tone ration

Color Gradient Groups

Face

Tone  
Pixels

Outline  
Pixels

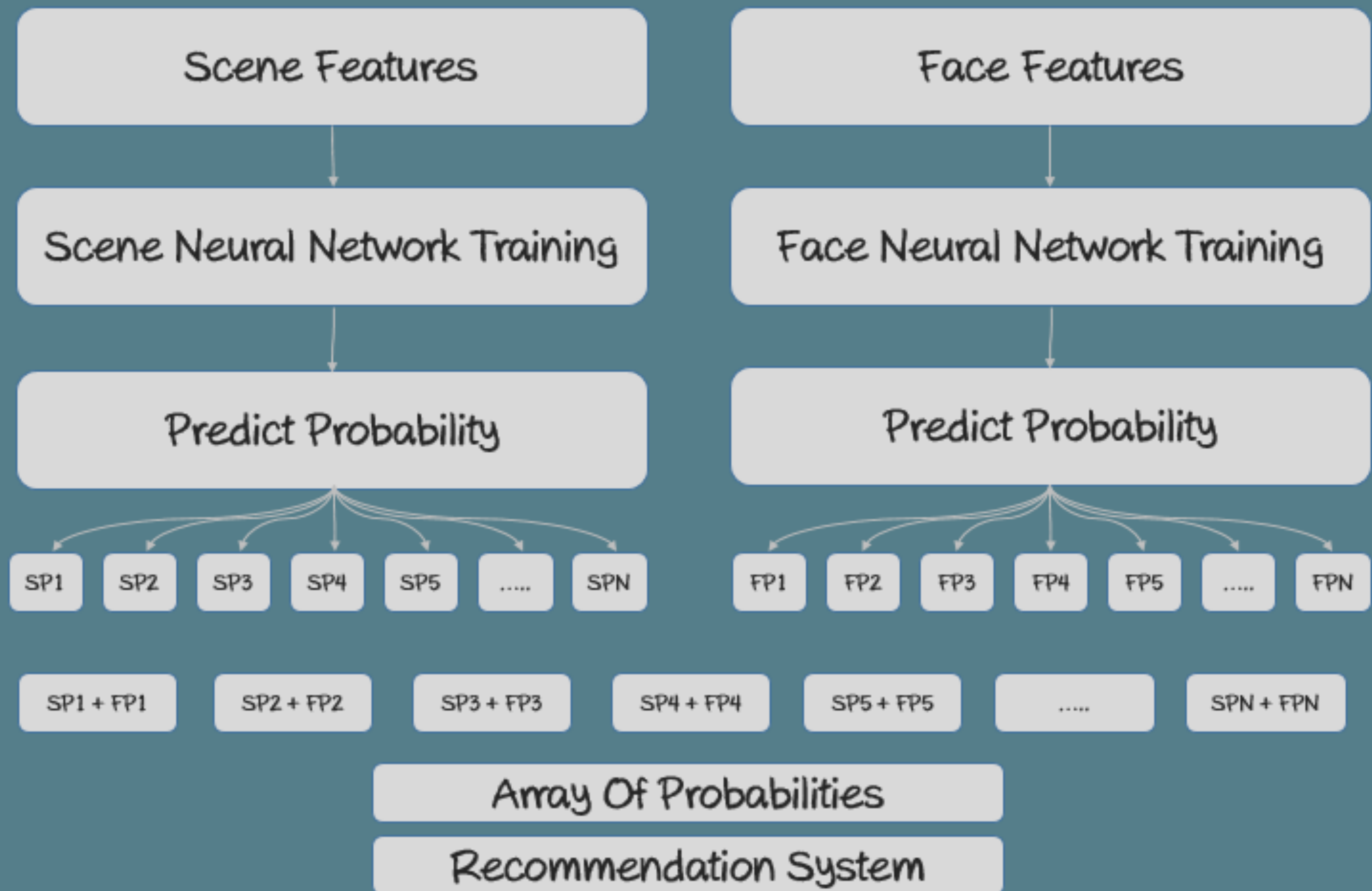
Outline  
Vectors

Outline to Tone ration

Color Gradient Groups



# Machine Learning





# Testing

# Experiment I

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Manga	Fraction 1	Fraction 2	Fraction 3
Hamlet	Hamlet1	Hamlet2	Hamlet3
RinToSiteSippuNoNaka	RinToSiteSippuNoNaka1	RinToSiteSippuNoNaka2	RinToSiteSippuNoNaka3
TapkunNoTanteisitsu	TapkunNoTanteisitsu1	TapkunNoTanteisitsu2	TapkunNoTanteisitsu3
TouyouKidan	TouyouKidan1	TouyouKidan2	TouyouKidan3



# Experiment I

- 84% prediction Accuracy

Manga	Prediction 1	Prediction 2	Prediction 3
Hamlet1	Hamlet2	Hamlet3	RinToSiteSippuNoNaka1
Hamlet2	Hamlet1	Hamlet3	TouyouKidan2
Hamlet3	Hamlet2	Hamlet1	RinToSiteSippuNoNaka1
RinToSiteSippuNoNaka1	RinToSiteSippuNoNaka2	RinToSiteSippuNoNaka3	Hamlet1
RinToSiteSippuNoNaka2	RinToSiteSippuNoNaka1	RinToSiteSippuNoNaka3	Hamlet3
RinToSiteSippuNoNaka3	RinToSiteSippuNoNaka1	RinToSiteSippuNoNaka2	Hamlet1
TapkunNoTanteisitsu1	TouyouKidan1	TapkunNoTanteisitsu3	TapkunNoTanteisitsu2
TapkunNoTanteisitsu2	TouyouKidan1	TapkunNoTanteisitsu1	TapkunNoTanteisitsu3
TapkunNoTanteisitsu3	TapkunNoTanteisitsu1	TapkunNoTanteisitsu2	Hamlet2
TouyouKidan1	TapkunNoTanteisitsu2	TouyouKidan2	TapkunNoTanteisitsu1
TouyouKidan2	TouyouKidan1	Hamlet2	Hamlet1
TouyouKidan3	TouyouKidan1	TouyouKidan2	Hamlet1

# Experiment II

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Manga Groups	Manga				
Group I	Fairy Tail	Black Clover		One Piece	
Group II	Old Boy	The Legendary Musings of Professor Munakata		Crying Freeman	
Group III	Dungeon Seeker	Mushoku Tensei - Isekai Ittara Honki Dasu		Sword Art Online	Tate no Yuusha no Nariagari
Group IV	Love So Life		Seiyuu Ka-!		Skip Beat



# Experiment II

- 71.4% prediction Accuracy

Manga	Predictions			
Black Clover (ALL)	Fairy Tail	One Piece	Sword Art Online	The Legendary Musings of Professor Munakata
Crying Freeman --- Corrupted	Fairy Tail	Dungeon Seeker	Mushoku Tensei - Isekai Ittara Honki Dasu	Sword Art Online
Dungeon Seeker (2 OF 3)	Mushoku Tensei - Isekai Ittara Honki Dasu	Sword Art Online	Fairy Tail	Crying Freeman
Fairy Tail (1 OF 2)	One Piece	Dungeon Seeker	Seiyuu Ka-!	Tate no Yuusha no Nariagari
Love So Life (ALL)	Seiyuu Ka-!	Skip Beat	Dungeon Seeker	One Piece
Mushoku Tensei - Isekai Ittara Honki Dasu (2 OF 3)	Dungeon Seeker	Sword Art Online	Crying Freeman	Seiyuu Ka-!
Old Boy (ALL)	Crying Freeman	The Legendary Musings of Professor Munakata	Dungeon Seeker	Seiyuu Ka-!
One Piece (3 SAME GENRE)	Dungeon Seeker	The Legendary Musings of Professor Munakata	Sword Art Online	Mushoku Tensei - Isekai Ittara Honki Dasu
Seiyuu Ka-! (1 OF 2)	Skip Beat	One Piece	Fairy Tail	Dungeon Seeker
Skip Beat (1 OF 2)	Seiyuu Ka-!	Dungeon Seeker	Fairy Tail	One Piece
Sword Art Online (2 OF 3)	Dungeon Seeker	Mushoku Tensei - Isekai Ittara Honki Dasu	Fairy Tail	Crying Freeman
Tate no Yuusha no Nariagari (1 OF 3)	Dungeon Seeker	Crying Freeman	Skip Beat	Love So Life
The Legendary Musings of Professor Munakata (1 OF 2)	Crying Freeman	Dungeon Seeker	Mushoku Tensei - Isekai Ittara Honki Dasu	Skip Beat

# Limitations

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- Computational power and time.
- Resources and previous studies.
- Drawing similarity is subjective thing.



# Conclusion

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- Study the manga drawing aspects.
- Convert the similarity in manga to mathematical model.
- Create the FIRST manga recommendation system based on drawing style.





Black clover



Fairy tail



Sword art online



Thanks

Q & A