

Exploring Cultural Identity and Critical Regionalism through Classification

SCI 6492: Quantitative Aesthetics : Introduction to Machine Learning for Design

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Phase 1: Compile Dataset of Pre-Modern Regional Architecture

Dataset Sample 1

A collection of cultural architectural styles predating the 18th century, with the exception of the International Style, which emerged in the 1920s and 30s.

Dataset A
Japanese Architecture



Dataset B
Korean Architecture



Dataset C
Chinese Architecture



Dataset D
Indian Architecture



Dataset E
European Architecture



Dataset F
International Style



Training Classifiers

As-Is

Parameters:

- Epochs: 25
- Learning Rate: 0.003
- Random Rotations Degrees: 5
- Random Data Resize: (0.5, 1.0)

Purpose:

- Initial assessment of image classification
- Determination of desired resolution (10x10)

Detail Model

Parameters:

- Epochs: 25
- Learning Rate: 0.003
- Random Rotations Degrees: 5
- **Random Data Resize: (0.2, 0.3)**

Purpose:

- Experiment with classification on a more detailed scale
- Pick up more detailed features such as texture, ornamentation, etc.

Black and White

Parameters:

- Epochs: 25
- Learning Rate: 0.003
- Random Rotations Degrees: 5
- Random Data Resize: (0.5, 1.0)
- **Trained on black and white images**

Purpose:

- Assess the extent to which color does or does not impact classification
- Look at classification from a formal lens

Phase 2: Analyze Regional Architecture Built Between the 19th and 21st Centuries

Dataset Sample 2

A selection of architecture every two decades from 1800 to 2020.

Dataset A
Japanese Architecture



1814
Hondo Mimurotoji

Dataset B
Korean Architecture



1867
Hwaryeongjeon Hall

Dataset C
Chinese Architecture



1811
Wang Jia Da Yuan

Dataset D
Indian Architecture



1887
Cooch Behar Palace

Dataset E
European Architecture



1808
Arc De Triomphe Du Carrousel



1914
Tokyo Station



1910
DeoksugungSeokjojeon Hall



1927
Nanjing Presidential Palace



1864
General Post Office Kolkata



1977
Centre Pompidou



2012
Asakusa Culture And Tourism Center



1982
Ho Am Art Museum



2012
CCTV

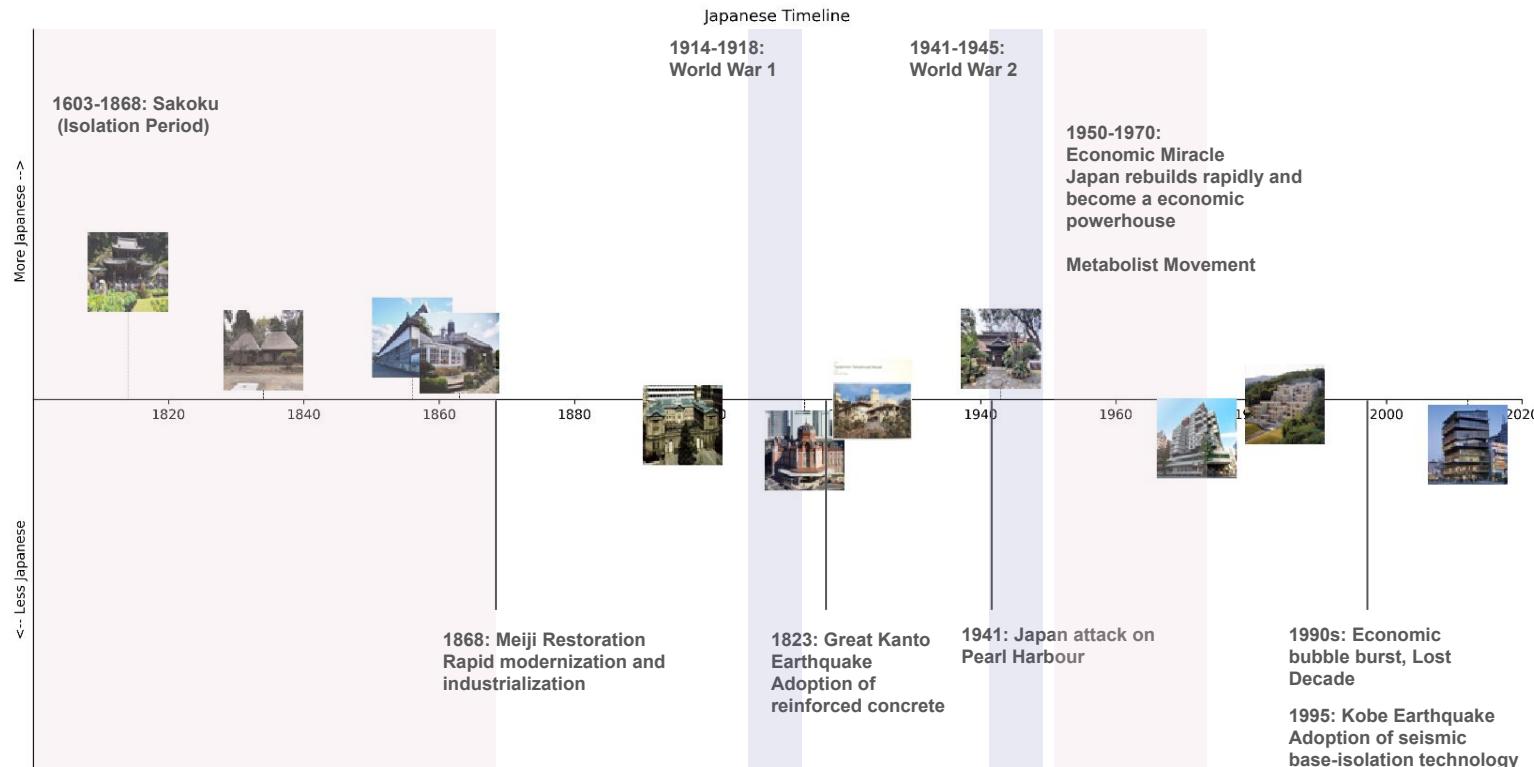


1936
Imperial New Delhi

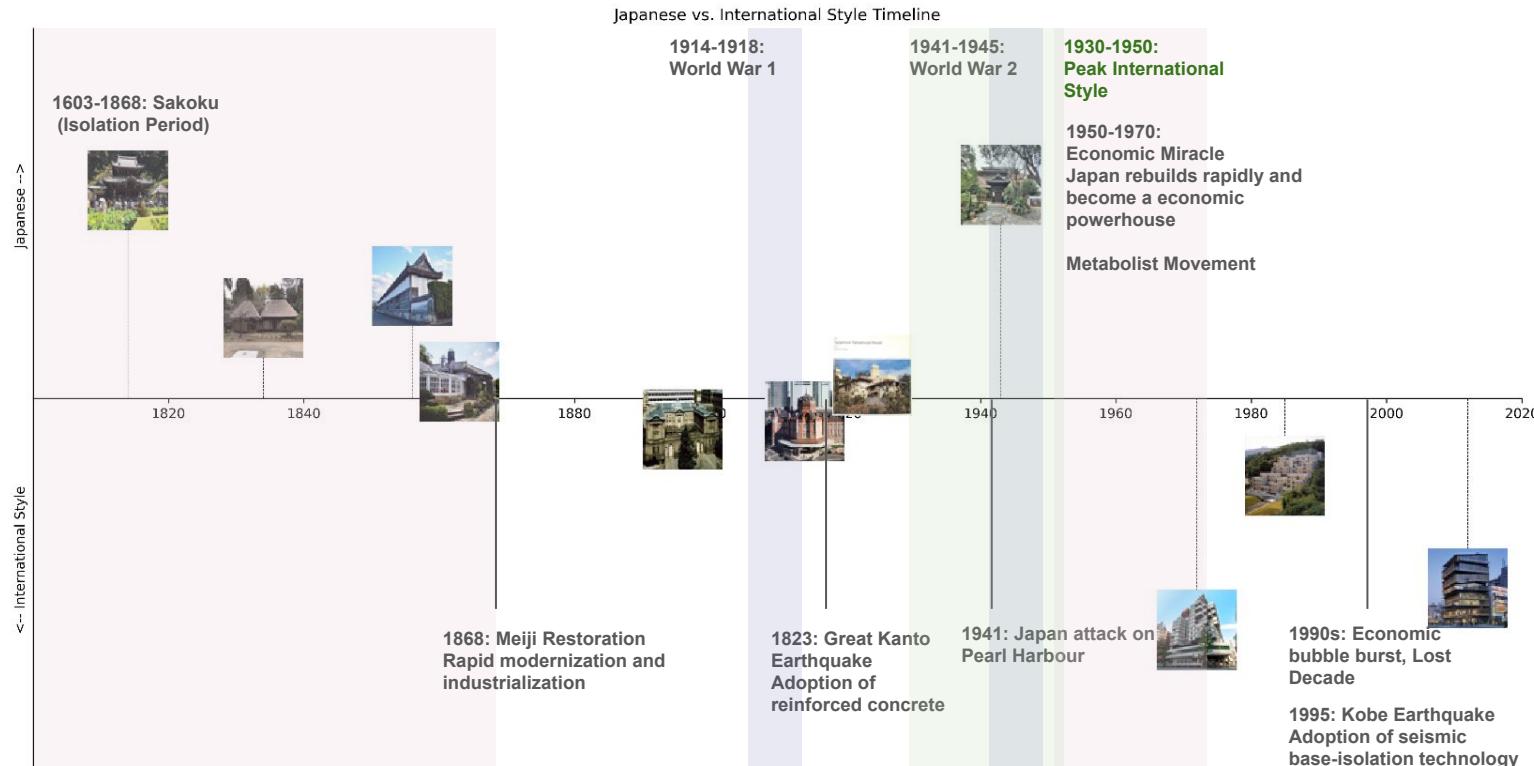


1997
Kunsthaus Bregenz

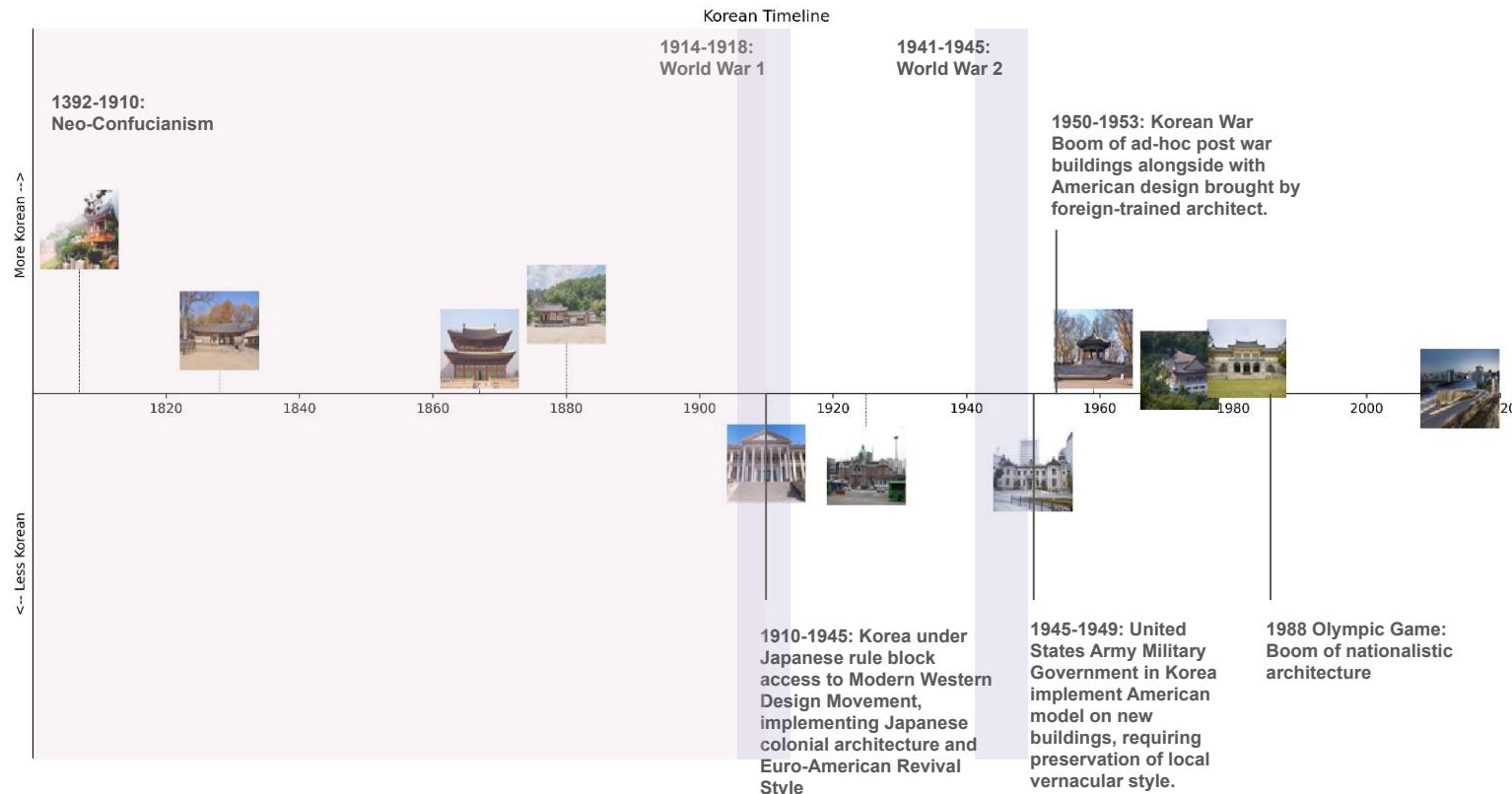
Japanese Architecture _ Deviation from Traditional Style



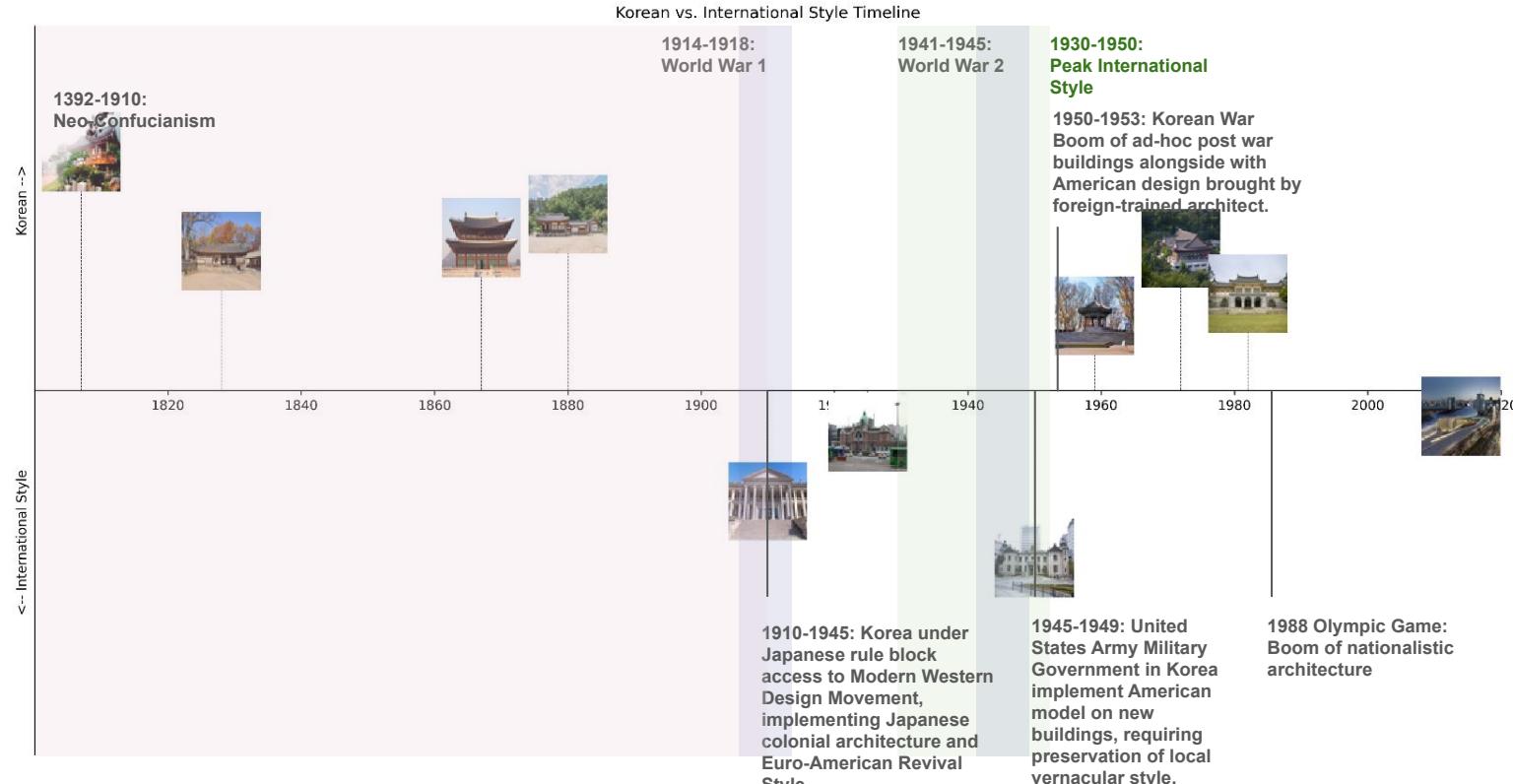
Japanese Architecture VS International Style



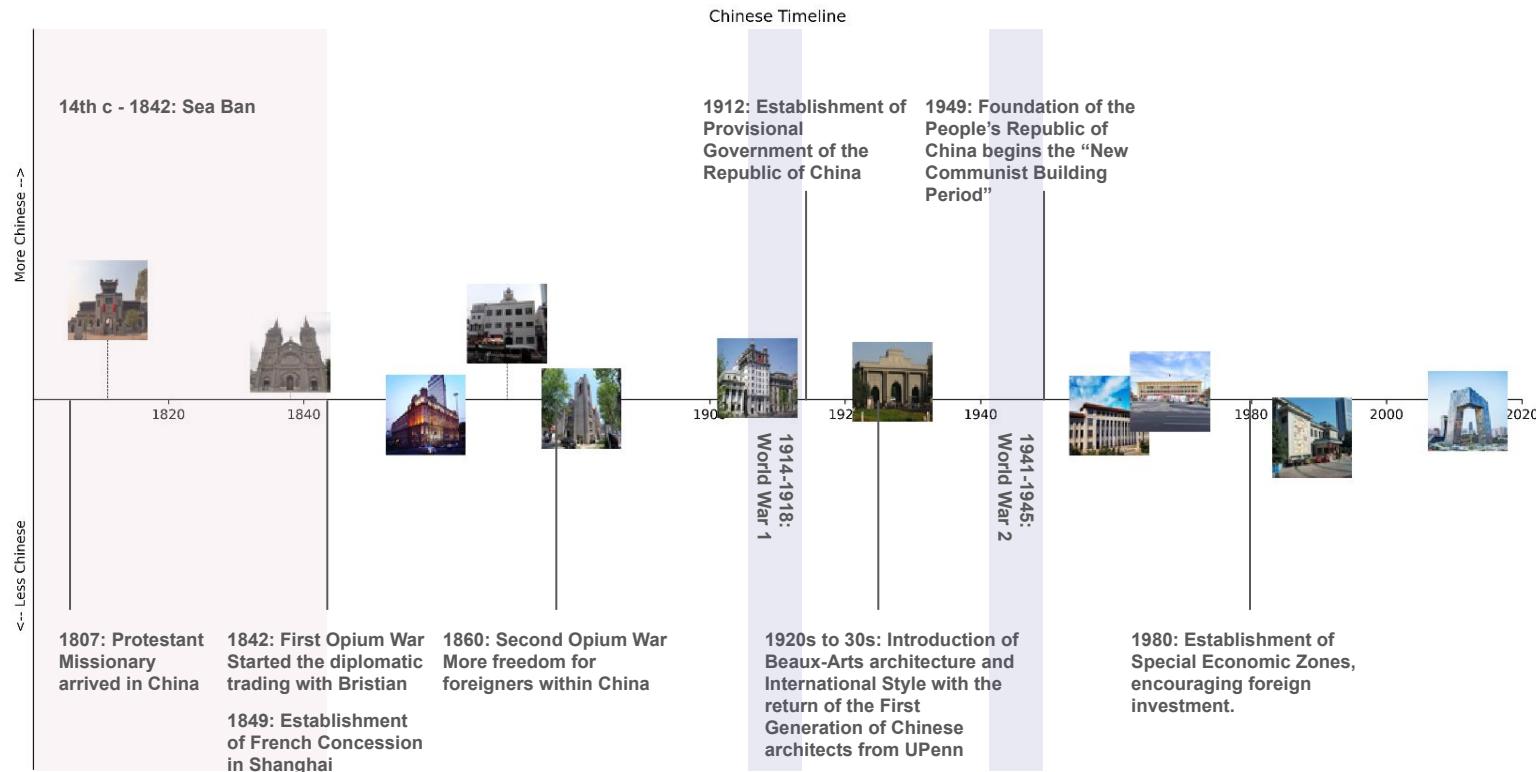
Korean Architecture _ Deviation from Traditional Style



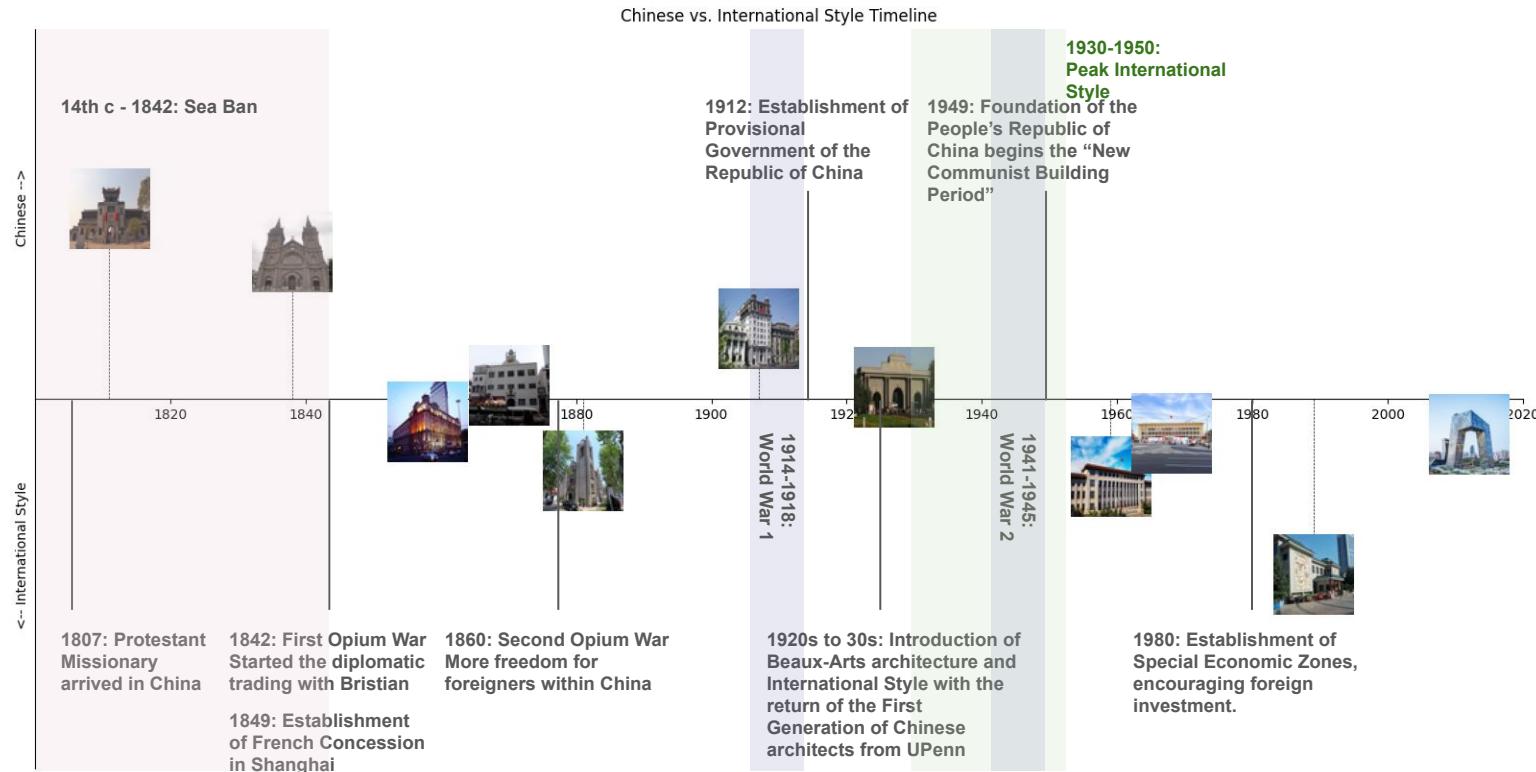
Korean Architecture VS International Style



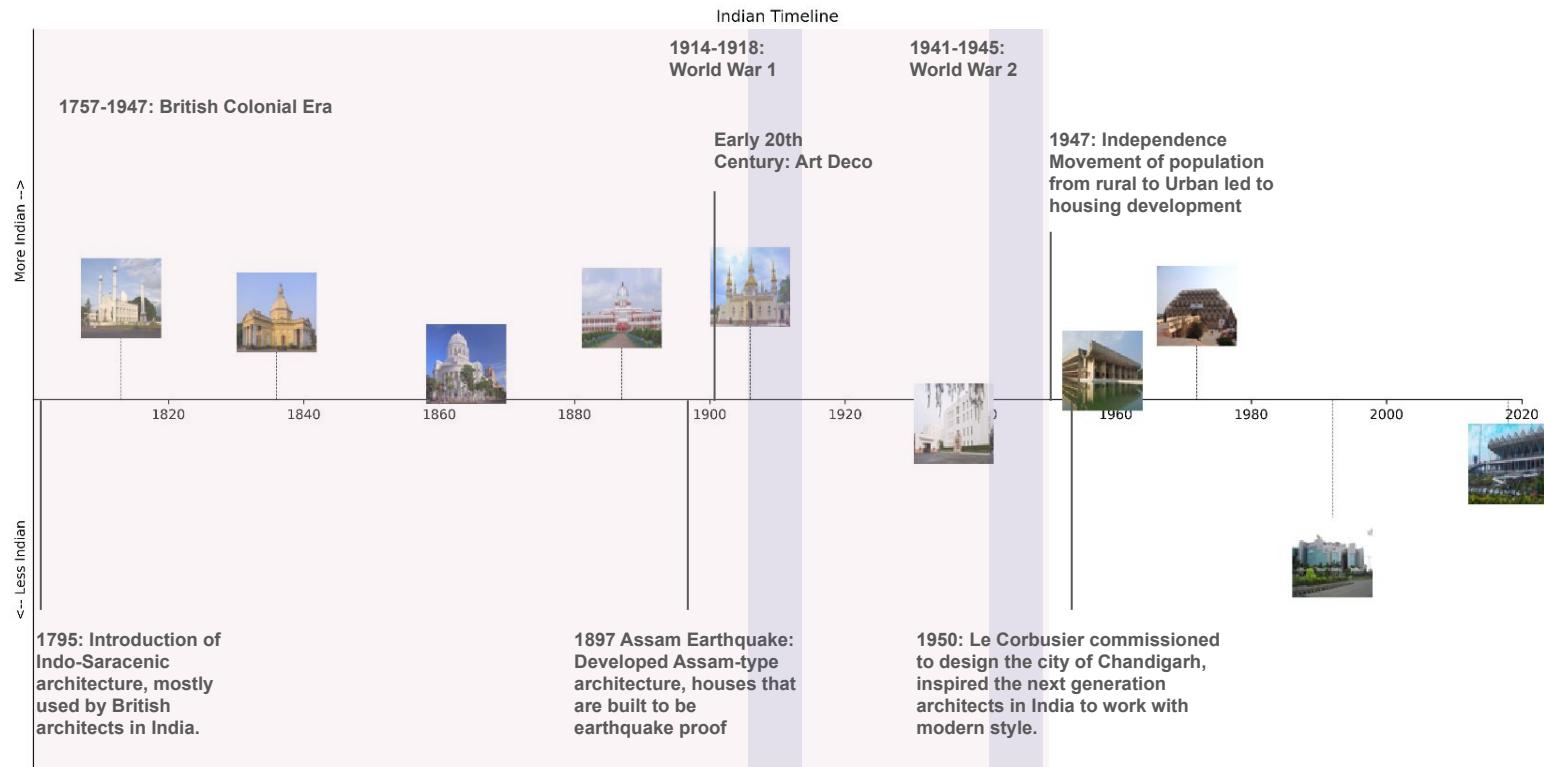
Chinese Architecture _ Deviation from Traditional Style



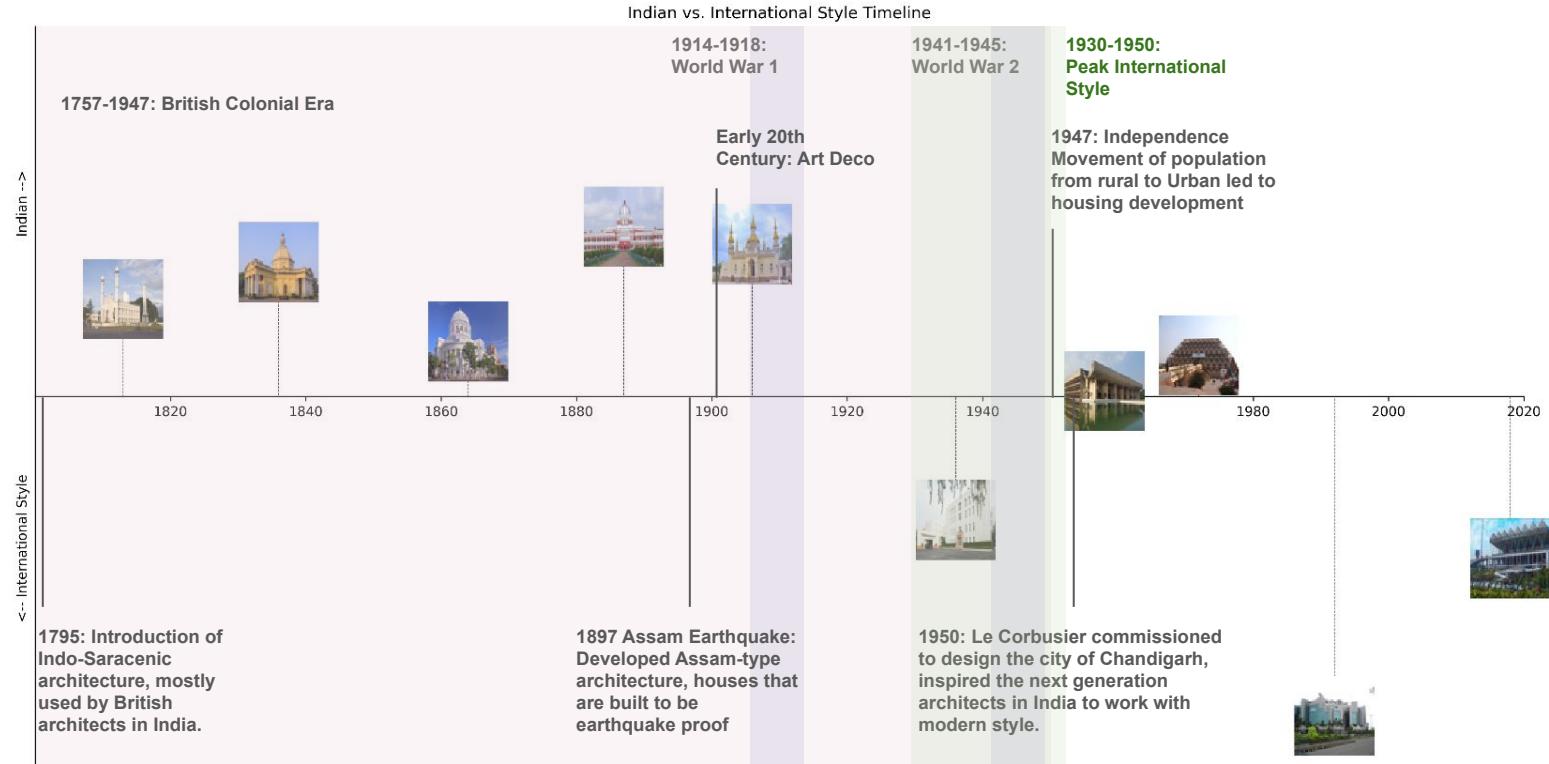
Chinese Architecture VS International Style



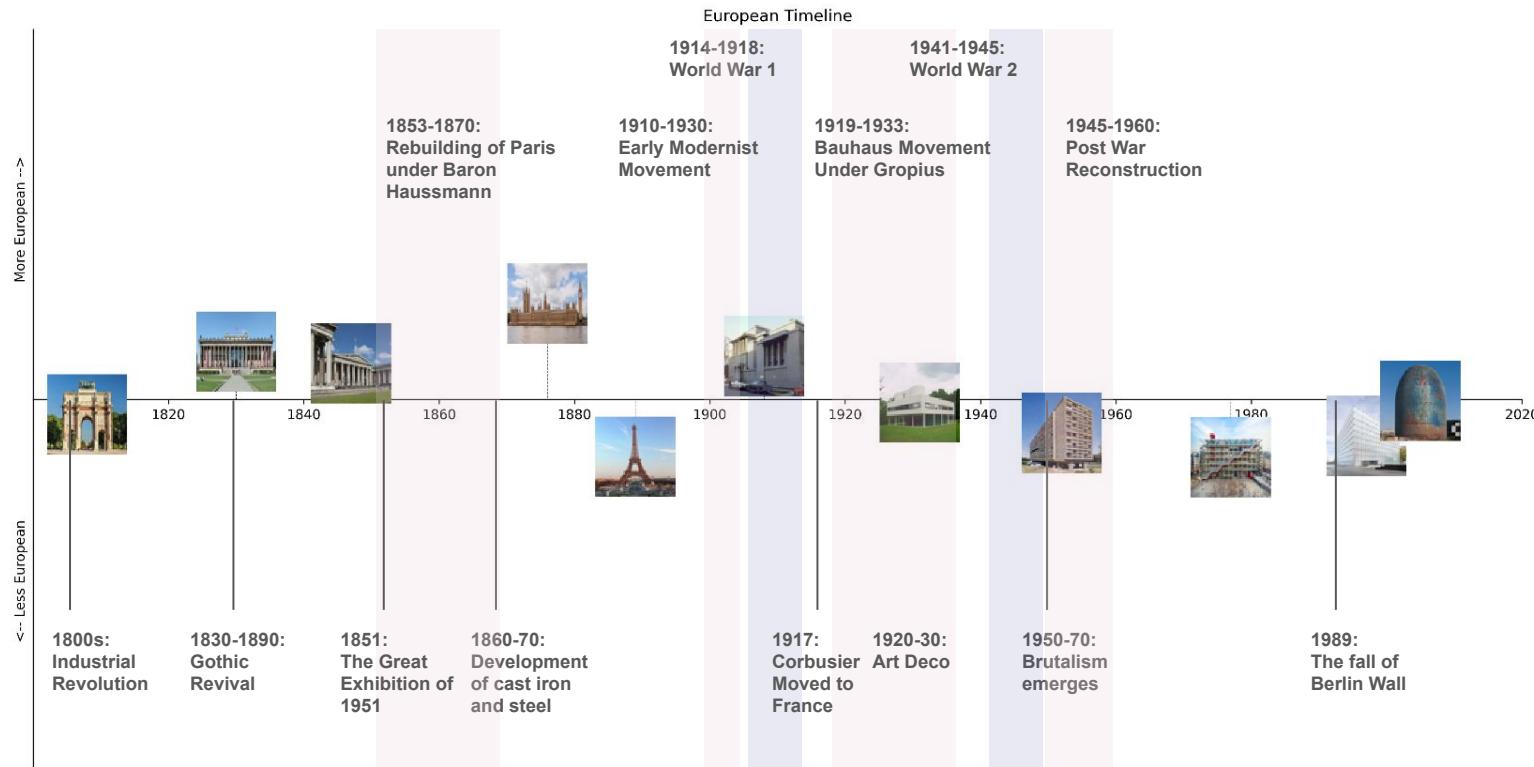
Indian Architecture _ Deviation from Traditional Style



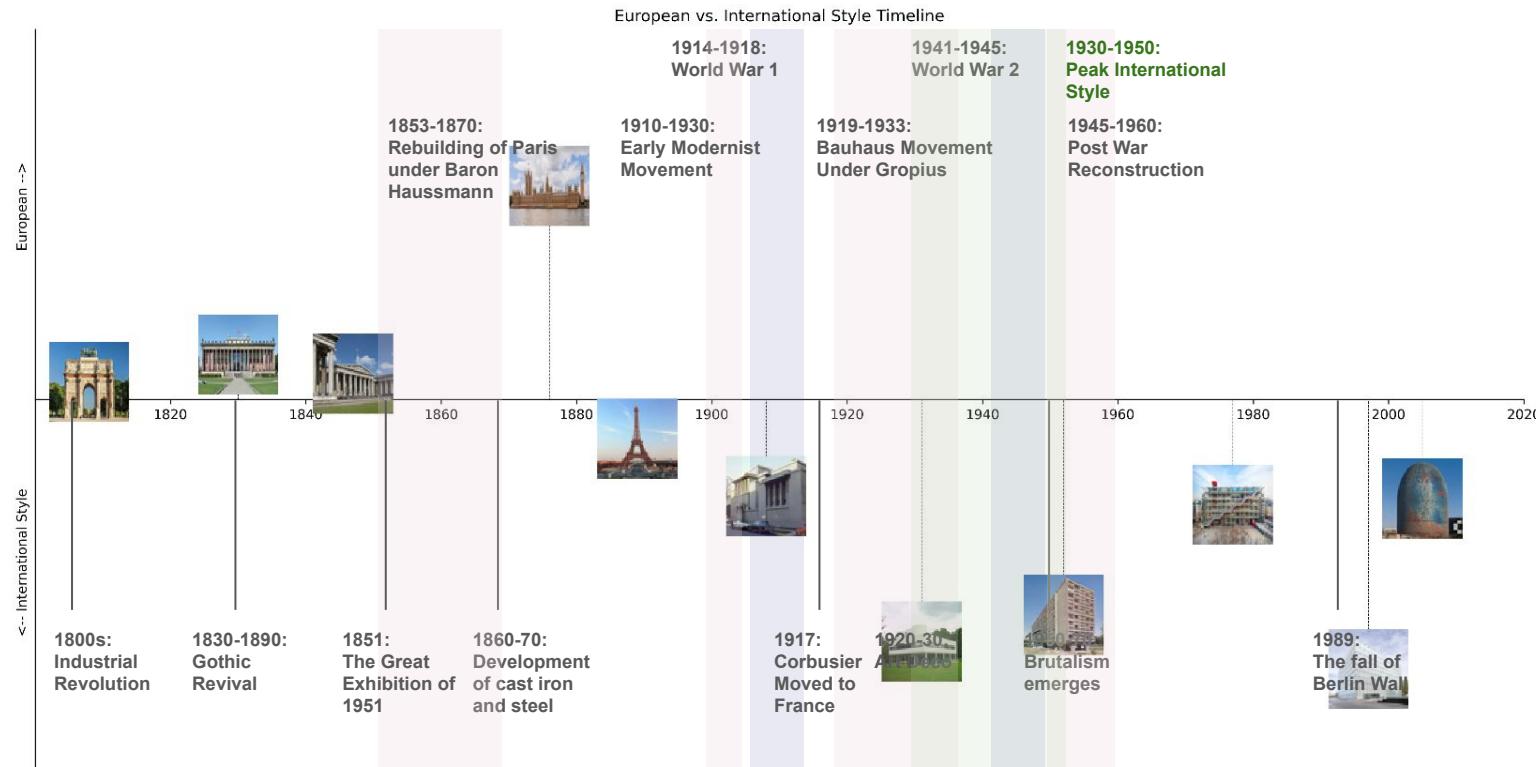
Indian Architecture VS International Style



European Architecture _ Deviation from Traditional Style



European Architecture VS International Style



Phase 3: Analyze Contemporary Architecture in Regional Styles

Dataset Sample 3

Contemporary Architectures that are claimed to be built with regional style

A
Japanese Architecture



2012
Asakusa Culture And Tourism Center

B
Korean Architecture



2013
Ga On Jai House

C
Chinese Architecture



2008
Ningbo Museum

D
Indian Architecture



2016
St George Orthodox Koonan
Kurishu Old Syrian Church

E
European Architecture



2019
James Simon Galerie

Japanese Architecture_Image Analysis

TRAINING MODEL: GENERIC



Original

2012
Asakusa Culture And Tourism Center



Japanese



Japanese Infill



International



International Infill

Japanese Architecture_Image Analysis

TRAINING MODEL: B/W



Original

2012
Asakusa Culture And Tourism Center



Japanese
Infill



International
Infill



Japanese Infill



International Infill

Japanese Architecture_Image Analysis

TRAINING MODEL: DETAIL ANALYSIS



Original

2012
Asakusa Culture And Tourism Center



Japanese



Japanese Infill



International



International Infill

Korean Architecture_Image Analysis

TRAINING MODEL: GENERIC



Original

2013
Ga On Jai House



Korean



Korean Infill



International



International Infill

Korean Architecture_Image Analysis

TRAINING MODEL: B/W



Original

2013
Ga On Jai House



Korean



Korean Infill



International



International Infill

Korean Architecture_Image Analysis

TRAINING MODEL: DETAIL ANALYSIS



Original

2013
Ga On Jai House



Korean



Korean Infill



International



International Infill

Chinese Architecture_Image Analysis

TRAINING MODEL: GENERIC

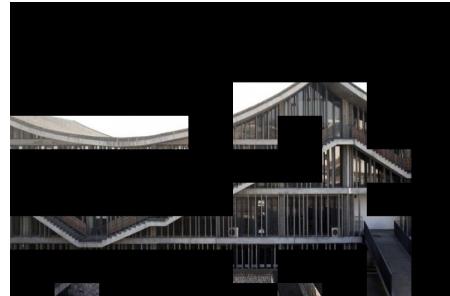


Original

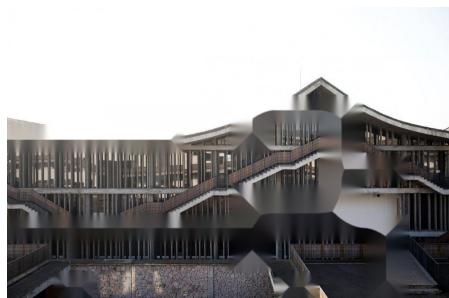
2008
Ningbo Museum



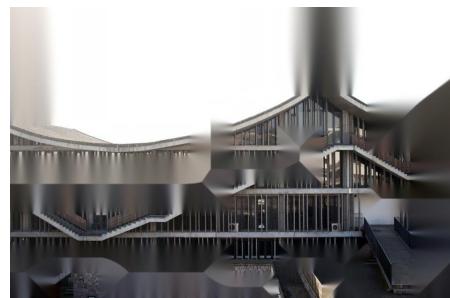
Chinese



International



Chinese Infill



International Infill

Chinese Architecture_Image Analysis

TRAINING MODEL: B/W

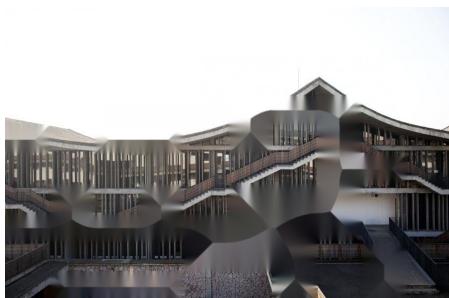


Original

2008
Ningbo Museum



Chinese



Chinese Infill



International



International Infill

Chinese Architecture_Image Analysis

TRAINING MODEL: DETAIL ANALYSIS



Original

2008
Ningbo Museum



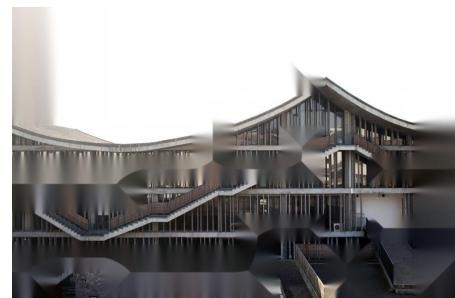
Chinese



International



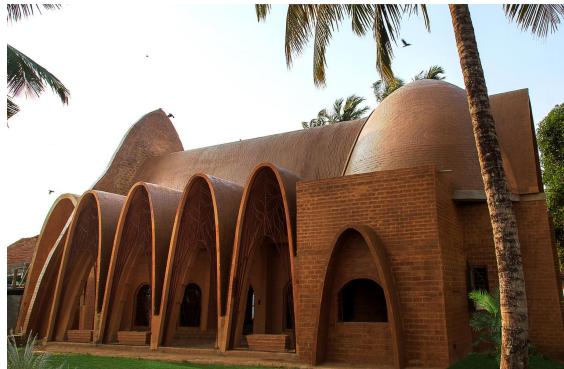
Chinese Infill



International Infill

Indian Architecture_Image Analysis

TRAINING MODEL: GENERIC



Original

2016
St George Orthodox Koonan
Kurishu Old Syrian Church



Indian



Indian Infill



International



International Infill

Indian Architecture_Image Analysis

TRAINING MODEL: B/W



Original

2016
St George Orthodox Koonan
Kurishu Old Syrian Church



Indian



Indian Infill



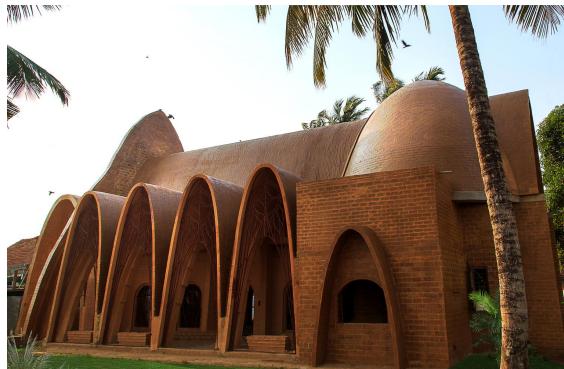
International



International Infill

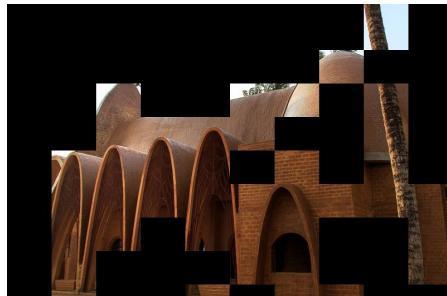
Indian Architecture_Image Analysis

TRAINING MODEL: DETAIL ANALYSIS



Original

2016
St George Orthodox Koonan
Kurishu Old Syrian Church



Indian



Indian Infill



International



International Infill

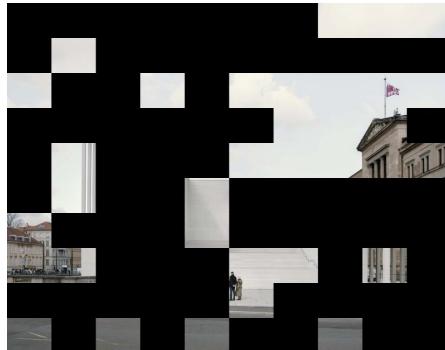
European Architecture_Image Analysis

TRAINING MODEL: GENERIC



Original

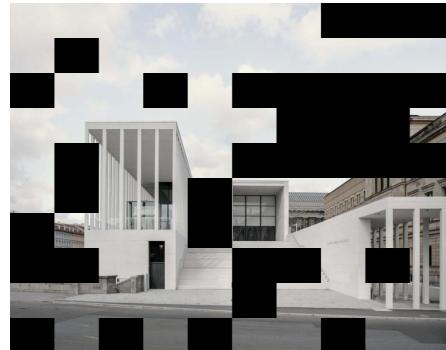
2019
James Simon Galerie



European



European Infill



International



International Infill

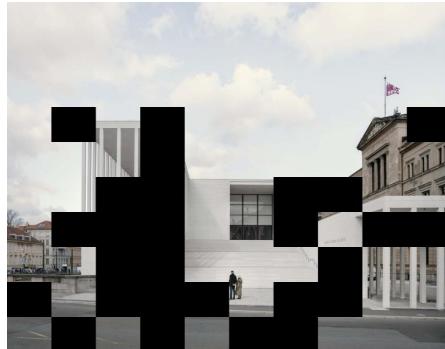
European Architecture_Image Analysis

TRAINING MODEL: B/W



Original

2019
James Simon Galerie



European



European Infill



International



International Infill

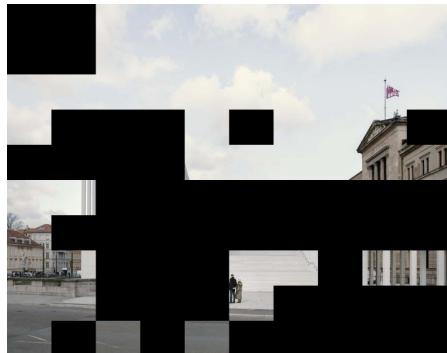
European Architecture_Image Analysis

TRAINING MODEL: DETAIL ANALYSIS



Original

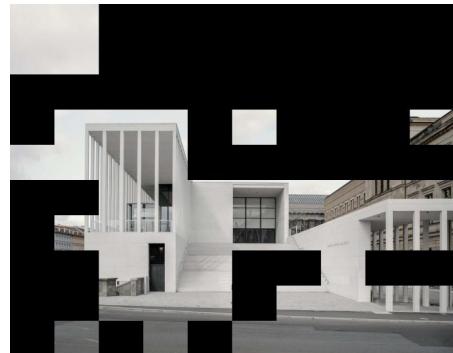
2019
James Simon Galerie



European



European Infill



International

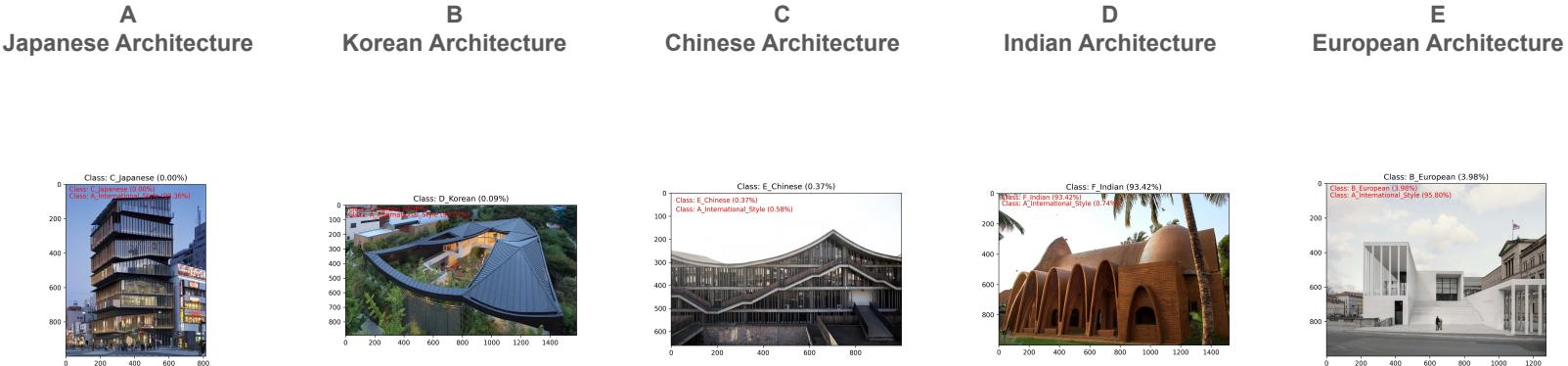


International Infill

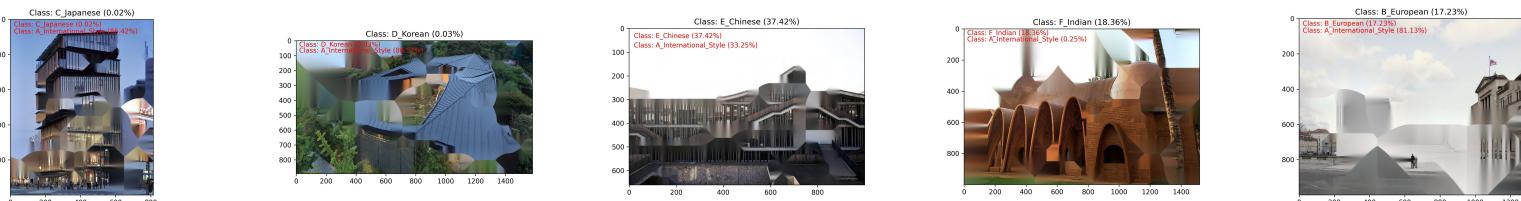
Phase 4: Reclassification of Original and Generated Images with Detail Model

Reclassification with Detail Model

Original Images

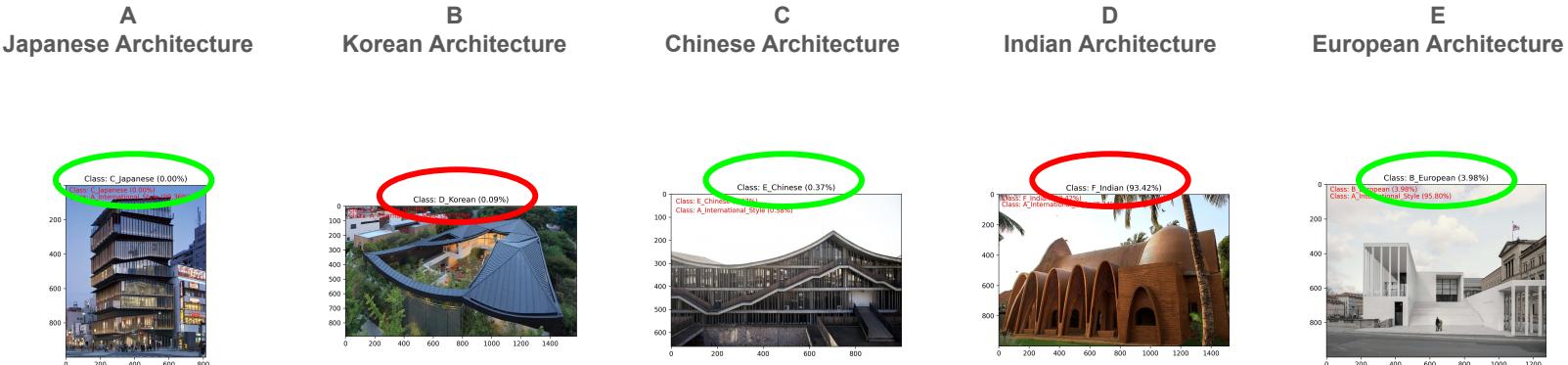


Generative Infill of Regional Style



Reclassification with Detail Model

Original Images



Note: Generative infill makes Japanese, Chinese, and European architecture more regionally distinct, whereas Korean and Indian architecture appear less regionally specific but also less international after the infill.

Japanese Best Models



Original



Best

Original Image

Best Analysis: BW
Prob Japanese: 0.26%
Prob Intl: 98.16%
Accuracy: -37,654%

Modified Image

Best Fragmentation: BW
Best Analysis: BW
Prob Japanese: 6.50%
Prob Intl: 90.50%
Accuracy: -1292%

Japanese Best Models



3d Print

3d Print

Best Analysis: Detail
Prob Japanese: 0.006%
Prob Intl: 78.89%
Accuracy: -1,258,200%

Original Image

Best Analysis: BW
Prob Japanese: 0.26%
Prob Intl: 98.16%
Accuracy: -37,654%

Modified Image

Best Fragmentation: BW
Best Analysis: BW
Prob Japanese: 6.50%
Prob Intl: 90.50%
Accuracy: -1292%

Korean Best Models



Original



Best

Original Image

Best Analysis: As-is
Prob Korean: 0.12%
Prob Intl: 52.31%
Accuracy: -43,492%

Modified Image

Best Fragmentation: Detail
Best Analysis: As-is
Prob Korean: 99.12%
Prob Intl: 0.81%
Accuracy: 99.18%

Korean Best Models



3d Print

3d Print

Best Analysis: As-is
Prob Korean: 31.24%
Prob Intl: 0.196%
Accuracy: 99.37%

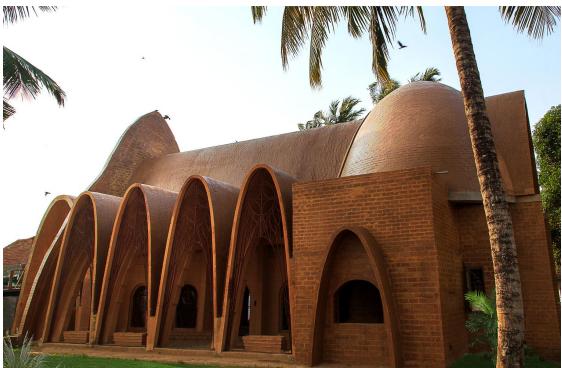
Original Image

Best Analysis: As-is
Prob Korean: 0.12%
Prob Intl: 52.31%
Accuracy: -43,492%

Modified Image

Best Fragmentation: Detail
Best Analysis: As-is
Prob Korean: 99.12%
Prob Intl: 0.81%
Accuracy: 99.18%

Indian Best Models



Original



Best

Original Image

Best Analysis: Detail
Prob Indian: 93.42%
Prob Intl: 0.74%
Accuracy: 99.21%

Modified Image

Best Fragmentation: BW
Best Analysis: Detail
Prob Indian: 43.87%
Prob Intl: 0.57%
Accuracy: 98.71%

Indian Best Models



3d Print

3d Print

Best Analysis: Detail
Prob Indian: 7.05%
Prob Intl: 19.48%
Accuracy: -176%

Original Image

Best Analysis: Detail
Prob Indian: 93.42%
Prob Intl: 0.74%
Accuracy: 99.21%

Modified Image

Best Fragmentation: BW
Best Analysis: Detail
Prob Indian: 43.87%
Prob Intl: 0.57%
Accuracy: 98.71%

Chinese Best Models



Original



Best

Original Image

Best Analysis: BW
Prob Chinese: 0.86%
Prob Intl: 0.23%
Accuracy: 73.26%

Modified Image

Best Fragmentation: BW
Best Analysis: Detail
Prob Chinese: 93.44%
Prob Intl: 6.55%
Accuracy: 92.99%

Chinese Best Models



3d Print

3d Print

Best Analysis: As-is
Prob Chinese: 10.45%
Prob Intl: 6.53%
Accuracy: 37.50%

Original Image

Best Analysis: BW
Prob Chinese: 0.86%
Prob Intl: 0.23%
Accuracy: 73.26%

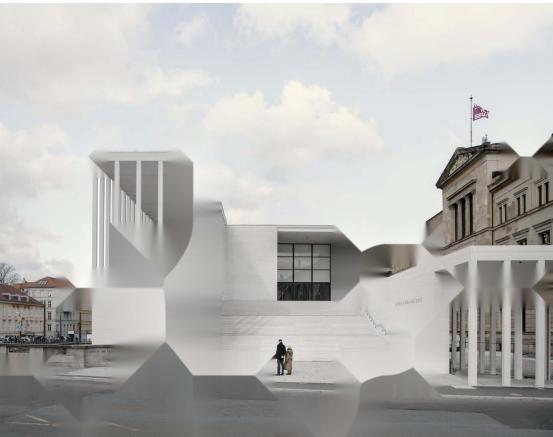
Modified Image

Best Fragmentation: BW
Best Analysis: Detail
Prob Chinese: 93.44%
Prob Intl: 6.55%
Accuracy: 92.99%

European Best Models



Original



Best

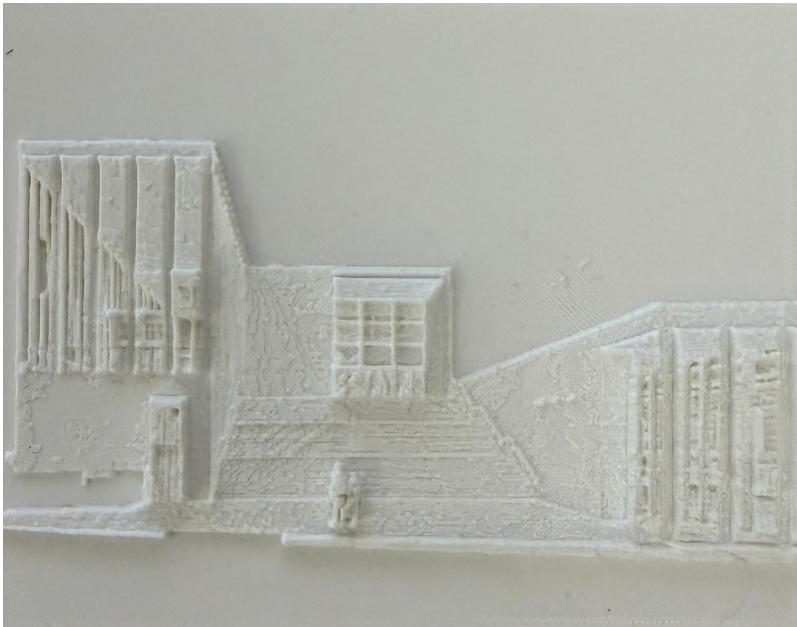
Original Image

Best Analysis: Detail
Prob European: 3.98%
Prob Intl: 95.80%
Accuracy: -2307%

Modified Image

Best Fragmentation: BW
Best Analysis: Detail
Prob European: 27.87%
Prob Intl: 71.35%
Accuracy: -156%

European Best Models



3d Print

3d Print

Best Analysis: BW
Prob European: 7.77%
Prob Intl: 64.59%
Accuracy: -731%

Original Image

Best Analysis: Detail
Prob European: 3.98%
Prob Intl: 95.80%
Accuracy: -2307%

Modified Image

Best Fragmentation: BW
Best Analysis: Detail
Prob European: 27.87%
Prob Intl: 71.35%
Accuracy: -156%

Phase 5: Plug and Play!

INTERACTIVE Image Analysis Sample



THANK YOU