GRAPHICAL APPENDIX

Full Visual Dataset for the CCSI Research Paper

"Cultural Cohesion and Social Inclusivity Index (CCSI): A Data-Driven Study of India's Civilizational Patterns"

Author: Tejas Pradip Pawar

This appendix contains all 17 research figures used during analysis. Due to IEEE page-limit constraints, only 3 visualizations were placed in the main paper. This appendix provides the complete dataset-driven graphical evidence, including historical CCSI timelines, dimensional heatmaps, and ML-based clustering diagnostics.

Full Indicator Glossary - for all 5 Dimensions considered for Scoring .

The Cultural Cohesion and Social Inclusivity Index (CCSI) evaluates each era across five dimensions, each scored 0–4 where:
0 = not present / extremely weak
4 = highly present / structurally embedded

D1 — Social Mobility
Code	Indicator Name	Meaning
D1_SM_StatusFluidity	Ability to move between social strata without birth-based restrictions
D1_SM_OccupationalMobility	Freedom to change profession without lineage or caste barriers
D1_SM_InterCommunityMobility	Ease of movement across caste/tribal/religious communities through marriage or adoption
D1_SM_UrbanRuralMobility	Flow of population between rural and urban spaces without status penalty
D1_SM_MilitaryAdministrativeAccess	Opportunity for disadvantaged groups to access military/state roles

D2 — Education & Knowledge Systems
Code	Indicator Name	Meaning
D2_KnowledgeGatekeeping	Degree of exclusion from learning centers based on caste/lineage
D2_PedagogicalInclusivity	Availability of learning across social groups and languages
D2_PublicKnowledgeInfrastructure	Spread of schools/universities/libraries accessible to common population
D2_ScholarshipPlurality	Coexistence of diverse philosophical/knowledge traditions
D2_LanguageAccess	Access to state/educational systems through multiple languages vs one elite language

D3 — Economic Structure
Code	Indicator Name	Meaning
D3_MarketIntegration	Strength of trade networks across regions
D3_Urbanization	Scale of urban economic activity
D3_LabourFlexibility	Degree of non-hereditary participation in economic sectors
D3_WealthDistributionMechanisms	Presence of welfare/redistributive support without stigma
D3_TaxAndAdministrativeReach	Ability of state institutions to function across territories

D4 — Polity & State Cohesion
Code	Indicator Name	Meaning
D4_SuccessionStability	Regular, peaceful succession rather than conflict-driven transition
D4_ConflictManagement	Ability to de-escalate internal conflicts
D4_FederalIntegration	Balance between regional autonomy and national unity
D4_InstitutionalContinuity	Stability of administrative and judicial systems
D4_PublicLegitimacy	Degree to which institutions are accepted as fair and representative

D5 — Cultural & Normative Hierarchy
Code	Indicator Name	Meaning
D5_NormativeHierarchyVsEquality	Strength of social ranking vs equality norms
D5_ReligiousPluralism	Coexistence of multiple faith systems without persecution
D5_SyncreticPractices	Mutual borrowing between traditions rather than segregation
D5_InterGroupContact	Everyday cross-community interaction (work, culture, neighbourhoods, festivals)
D5_RitualAccessibility	Ability of diverse groups to participate in public cultural or religious life

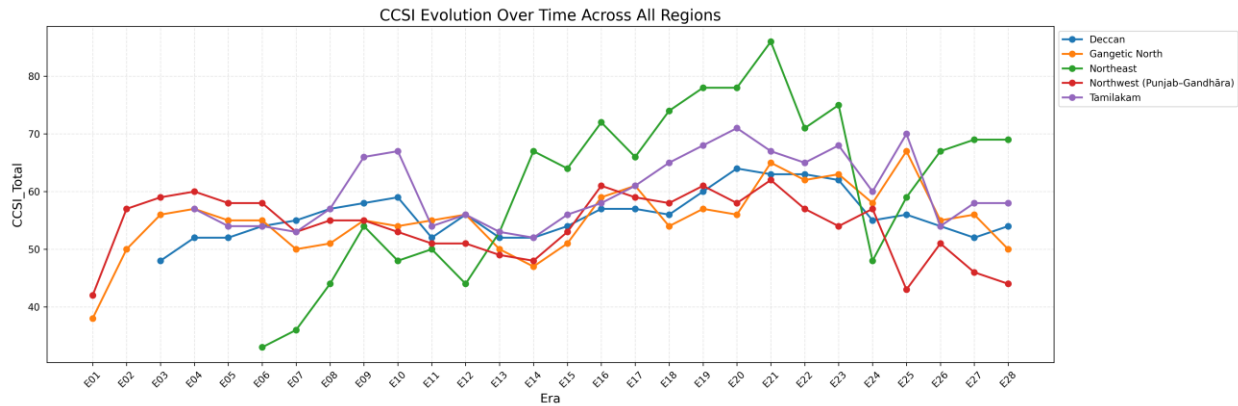# 📊 SECTION A — CCSI Time Series (Historical)

1️⃣ CCSI over Time – All Regions
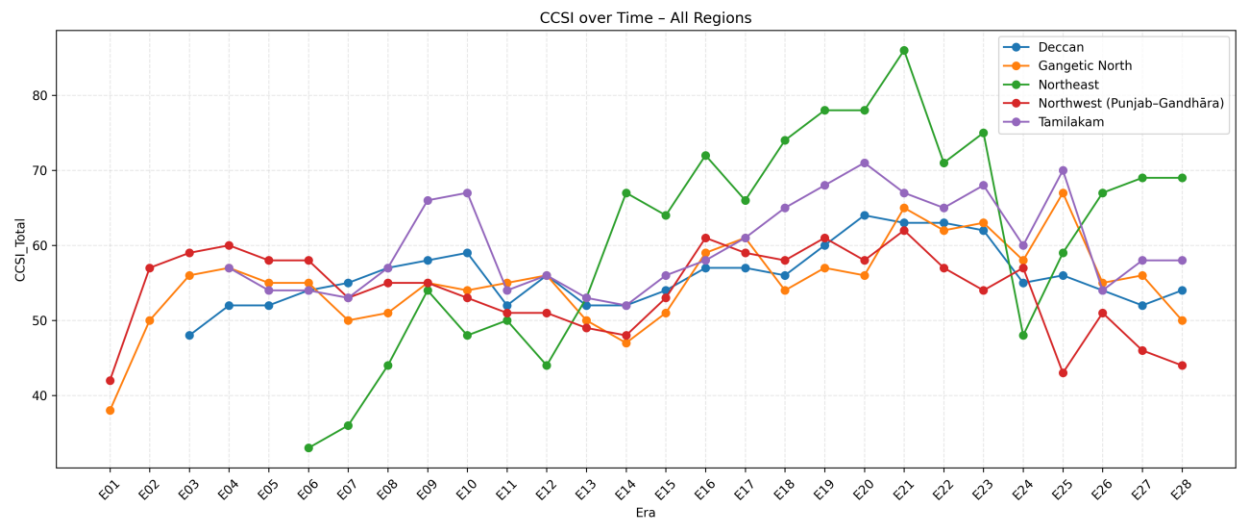
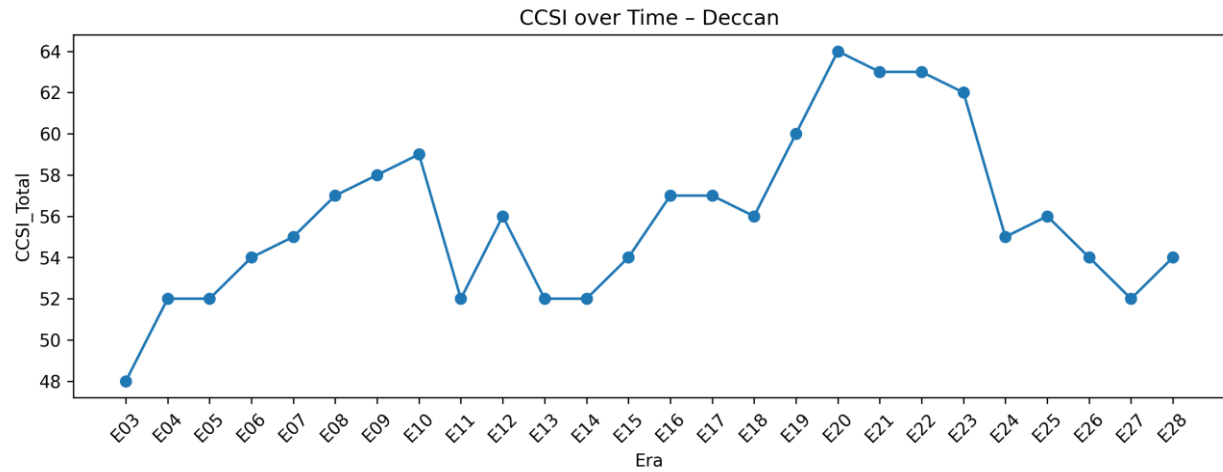## 2️⃣ 3-Era Rolling Mean of CCSI – All Regions
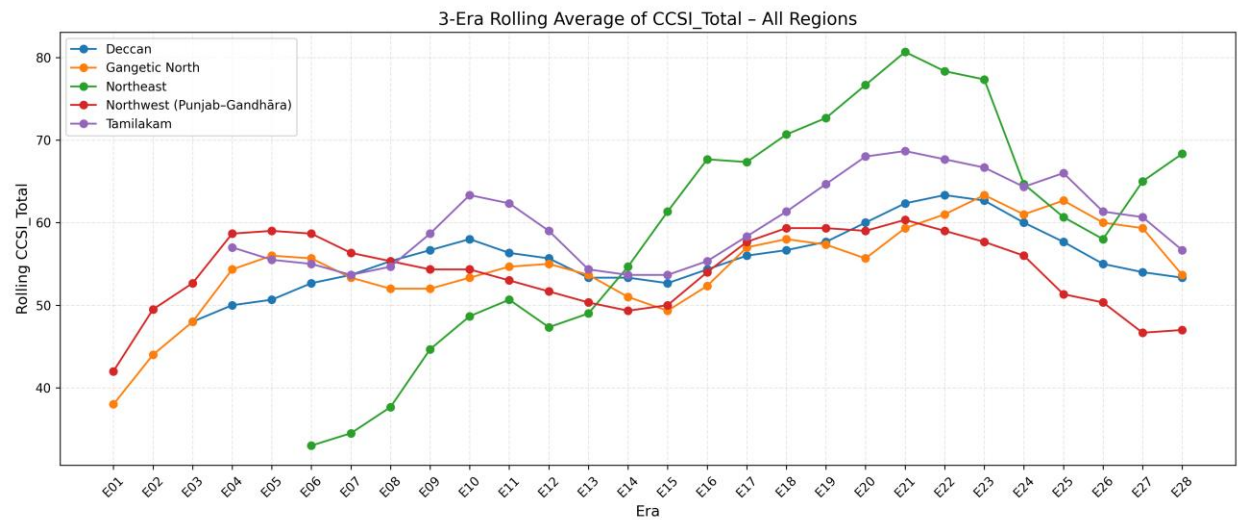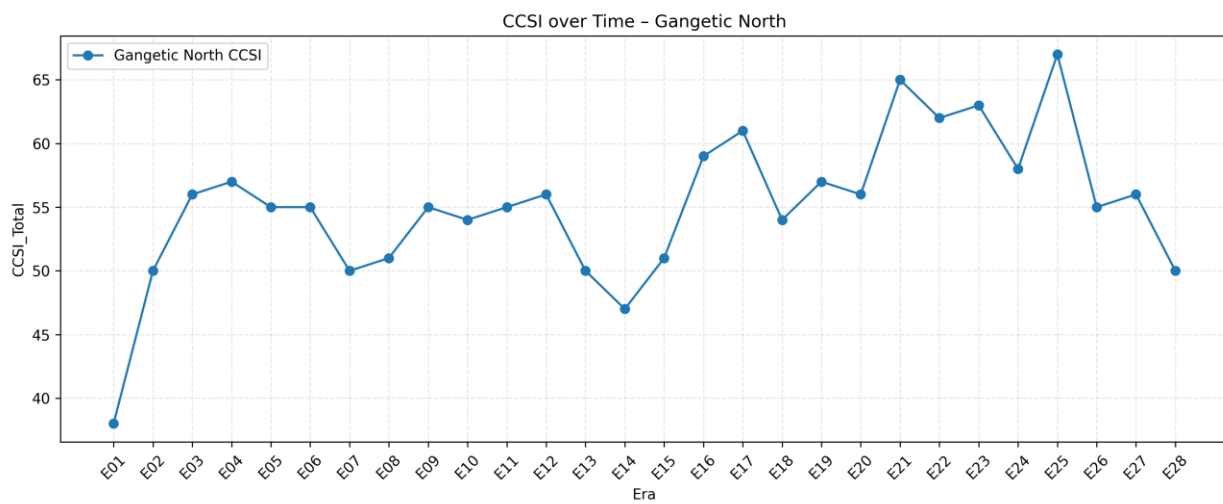

3️⃣ CCSI Evolution – Unified Timeline Plot
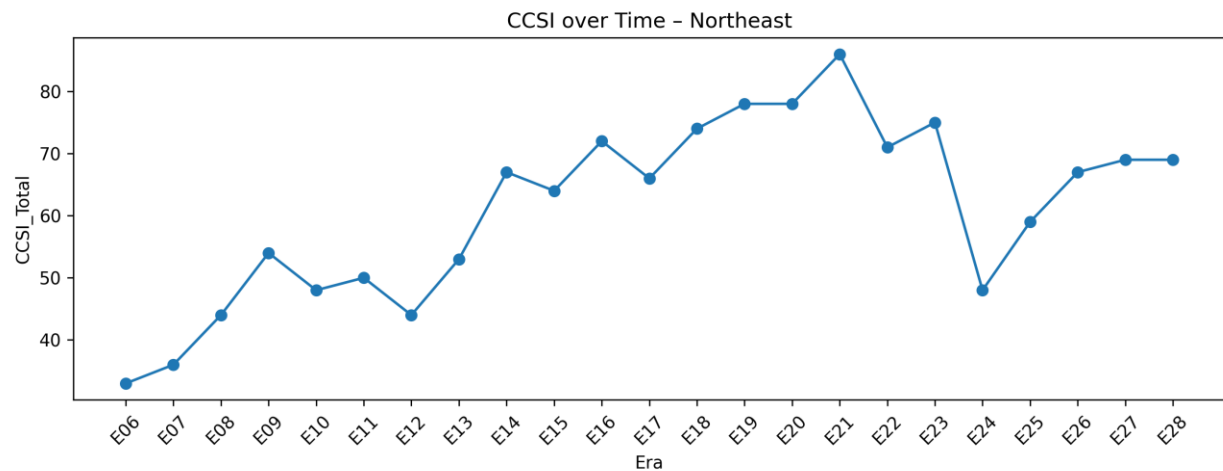

📊 SECTION B — Region-Specific CCSI Curves
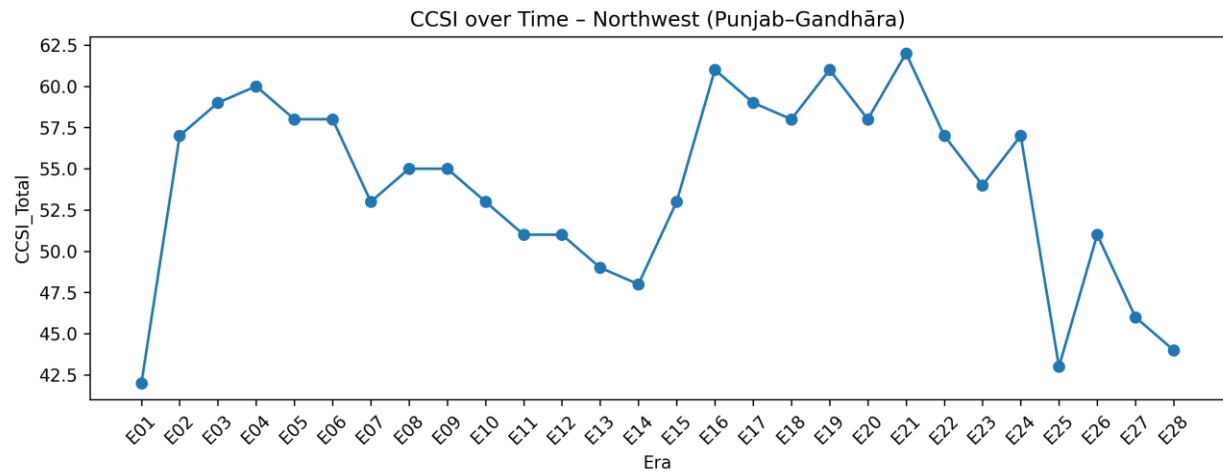
4️⃣ CCSI over Time – Deccan

CCSI over Time – Deccan

5️ CCSI over Time – Gangetic North

CCSI over Time – Gangetic North

6️ CCSI over Time – Northeast

CCSI over Time – Northeast

7️ CCSI over Time – Northwest (Punjab–Gandhāra)

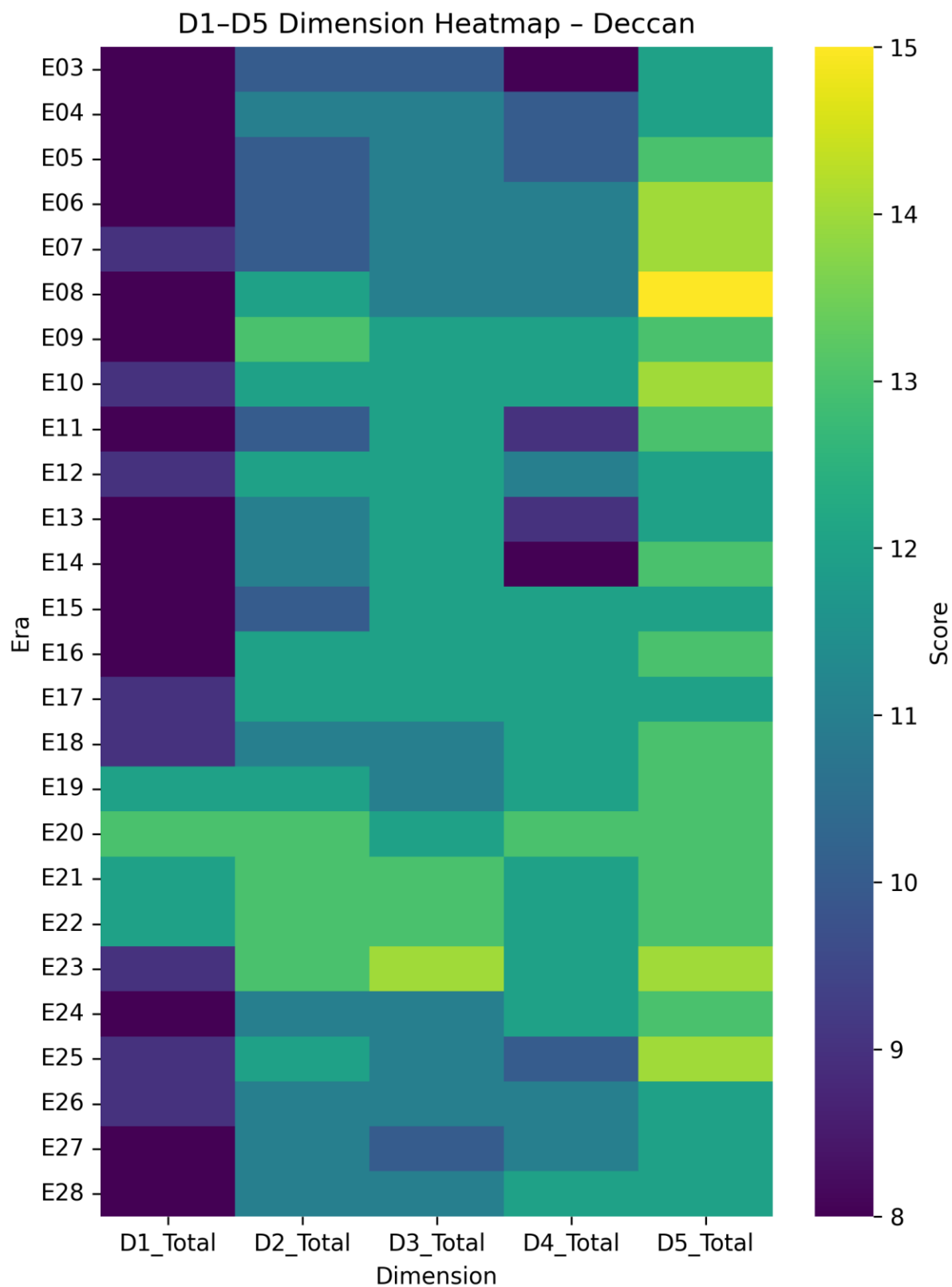CCSI over Time – Northwest (Punjab–Gandhāra)

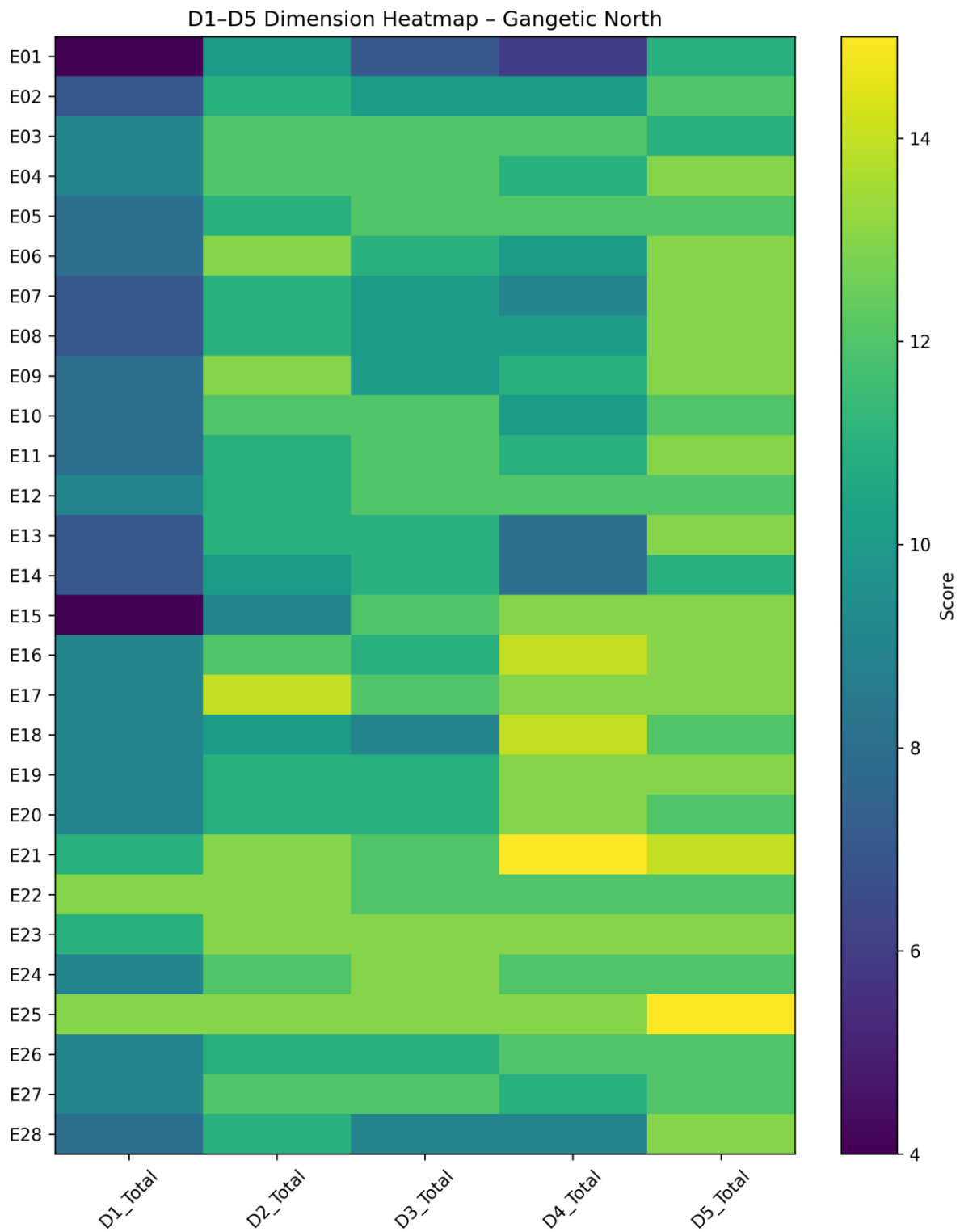## 8️ CCSI over Time – Tamilakam

CCSI over Time – Tamilakam
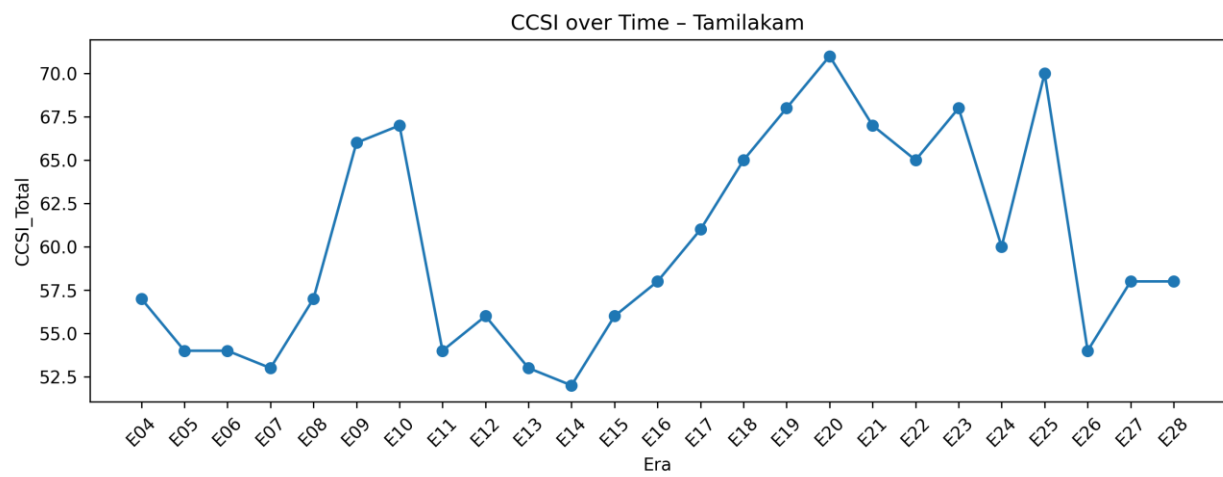
▢ SECTION C — D1–D5 Dimension Heatmaps

9️ D1-D5 Dimensional Heatmap – Deccan

D1–D5 Dimension Heatmap – Deccan

🔲 **D1-D5 Dimensional Heatmap – Gangetic North**

D1–D5 Dimension Heatmap – Gangetic North
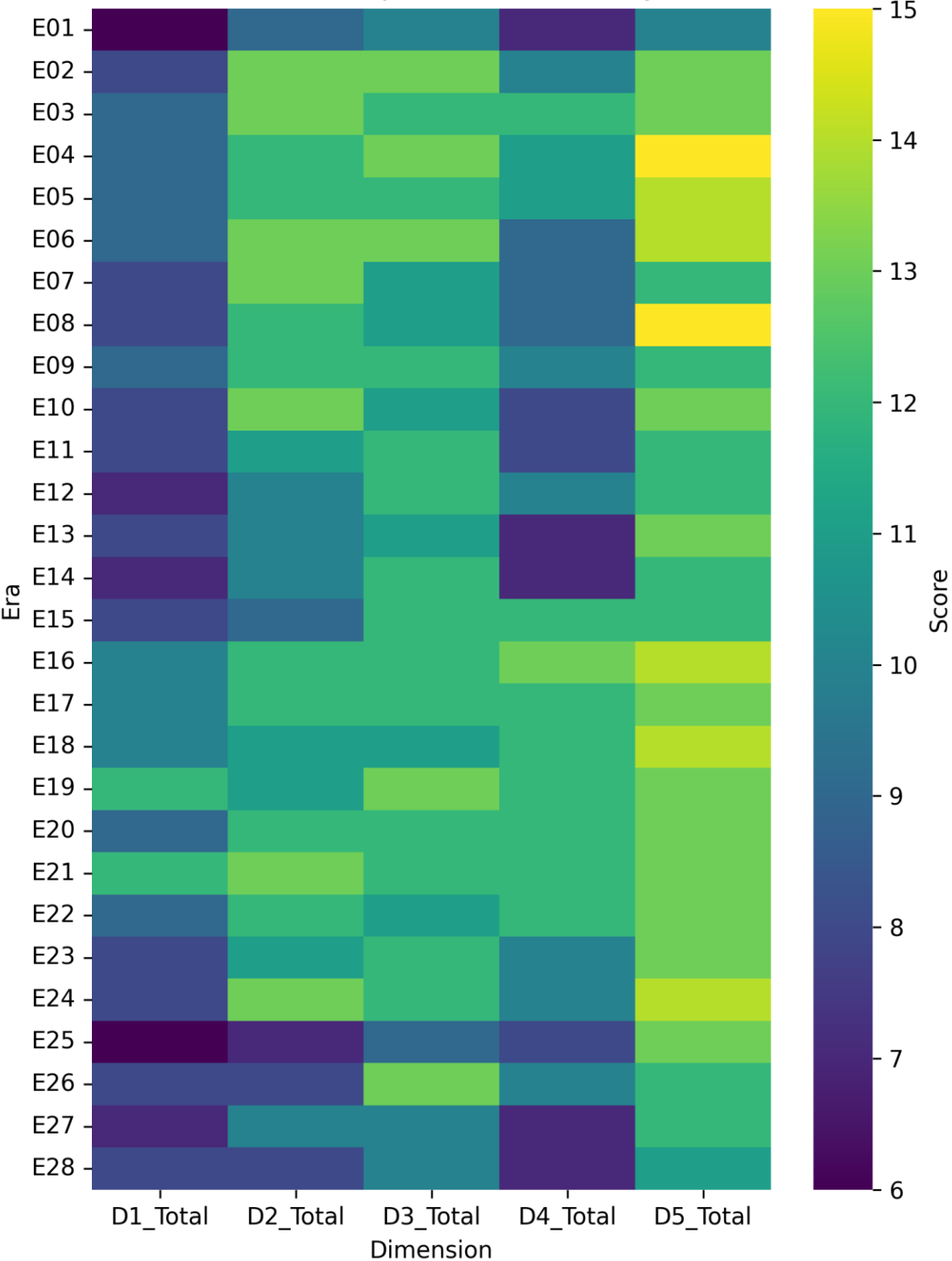
1．1． D1-D5 Dimensional Heatmap – Northeast

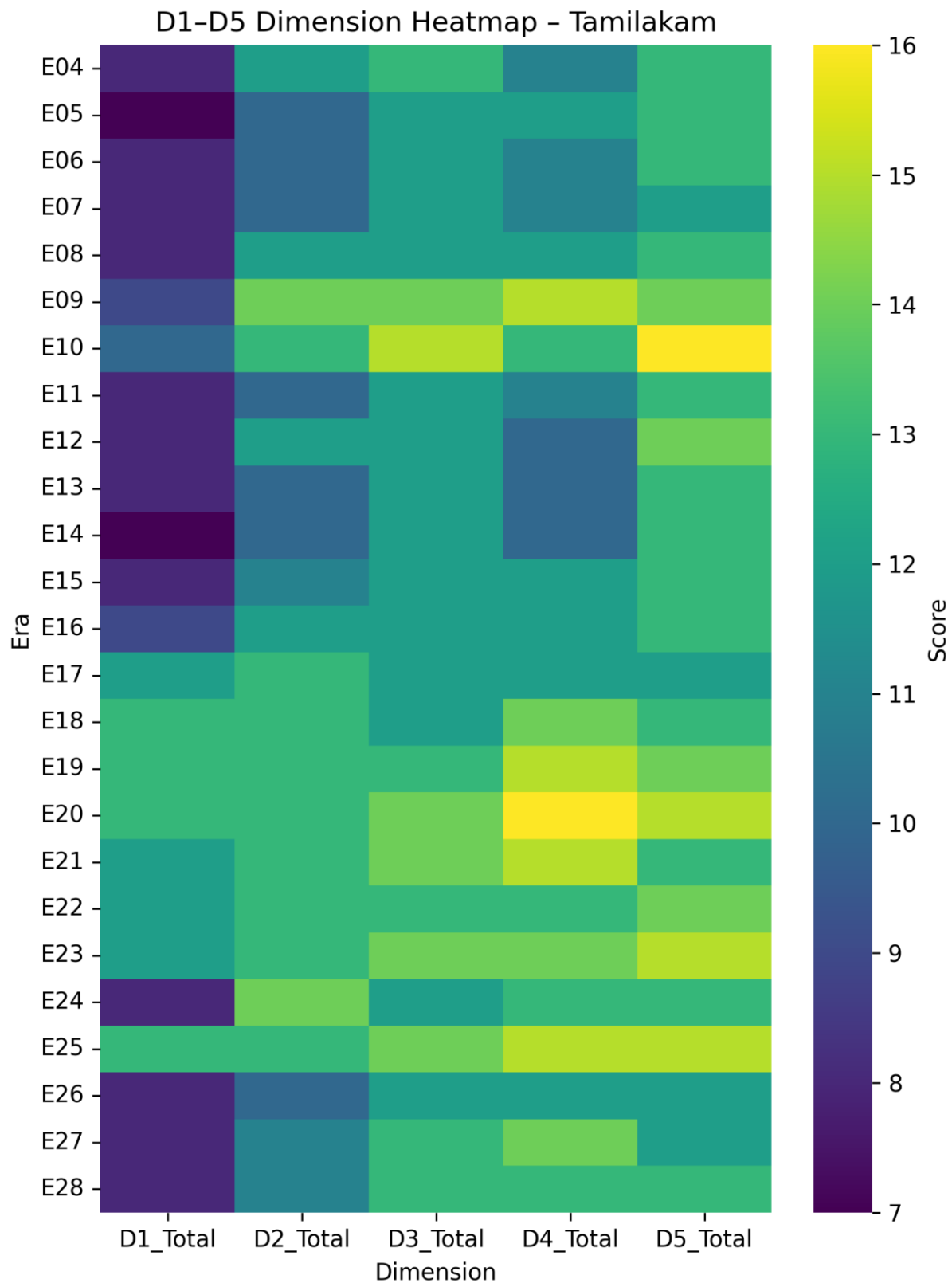D1–D5 Dimension Heatmap – Northeast
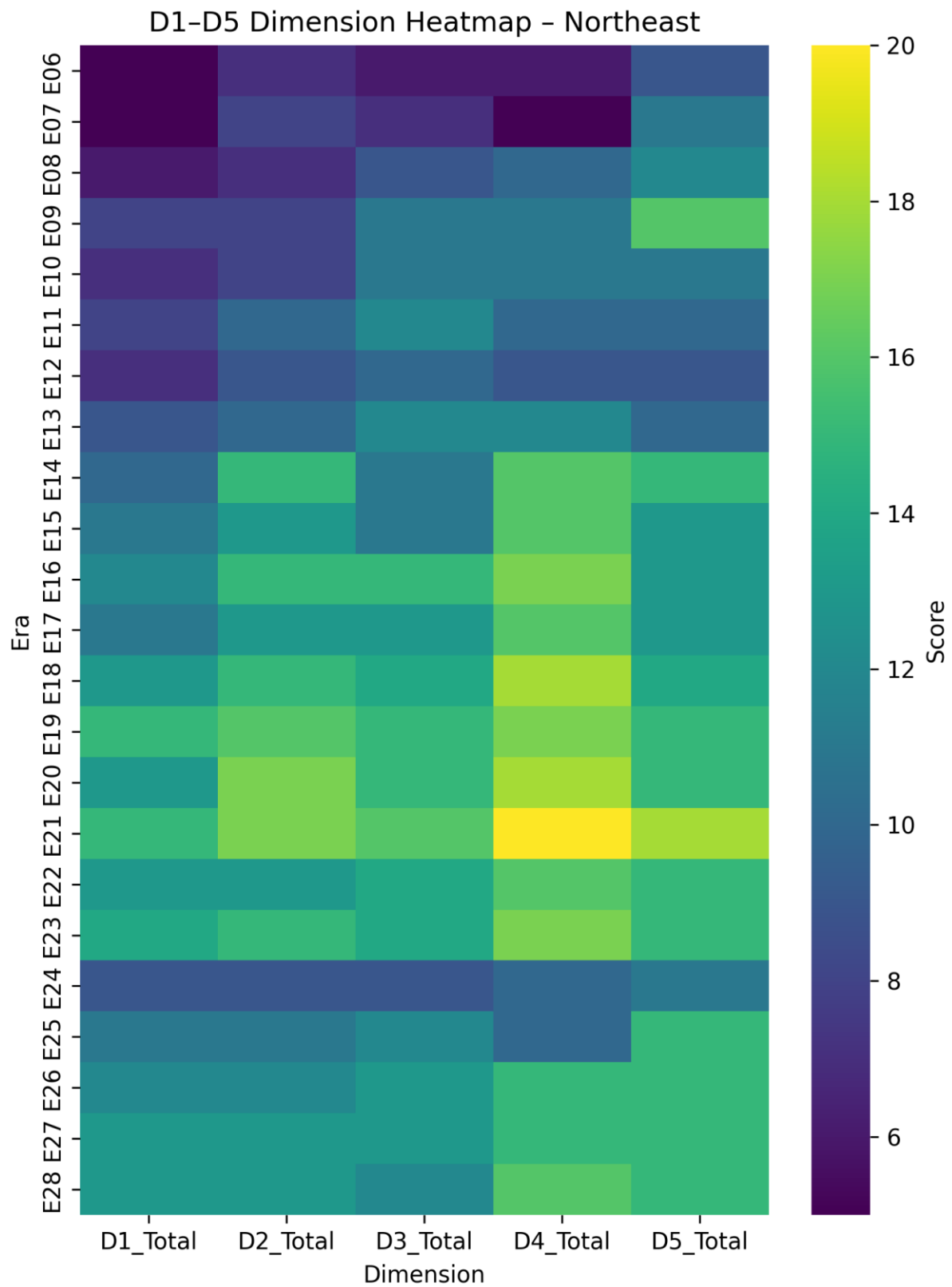
12 D1-D5 Dimensional Heatmap – Northwest (Punjab–Gandhāra)
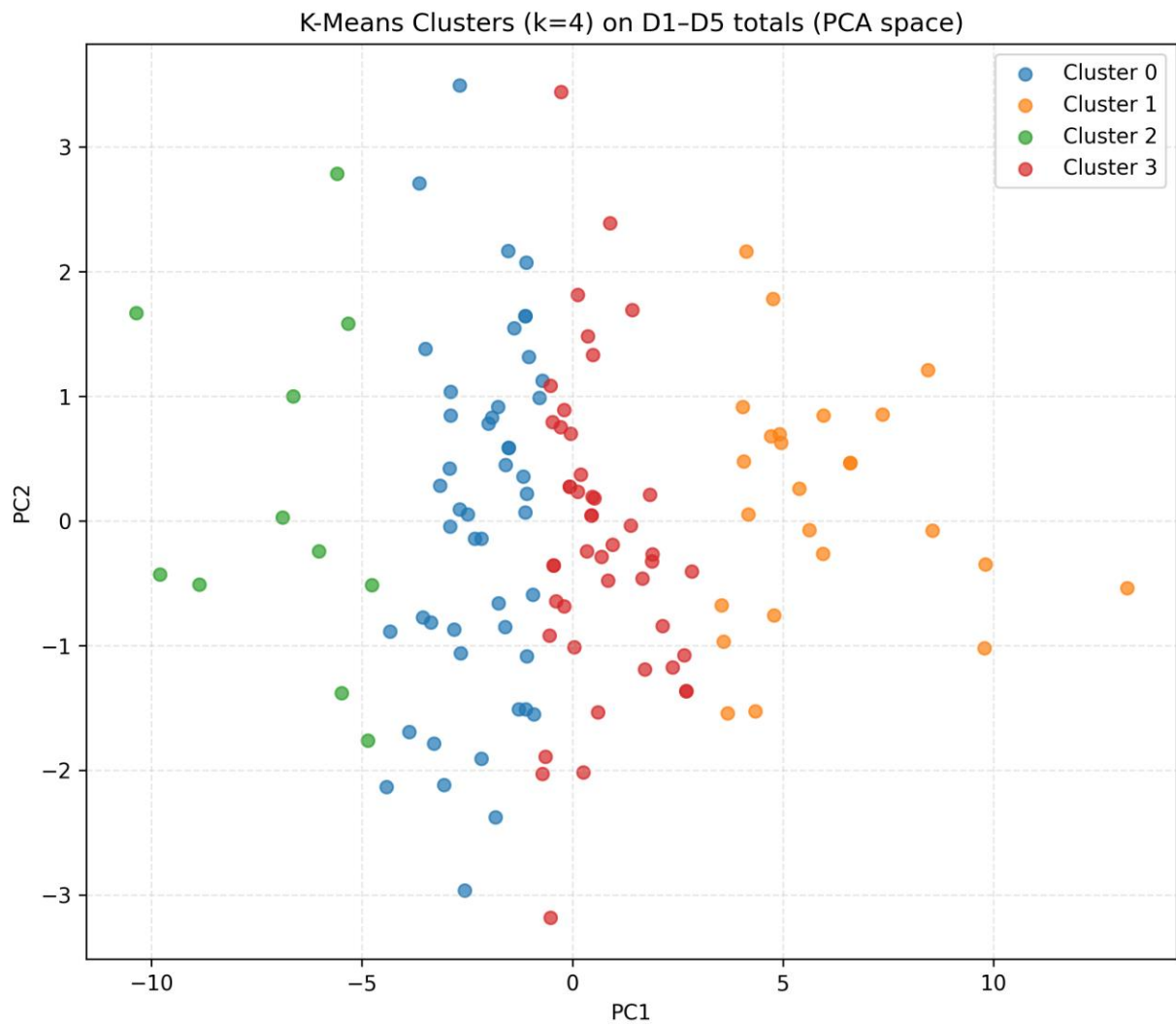
D1–D5 Dimension Heatmap – Northwest (Punjab–Gandhāra)
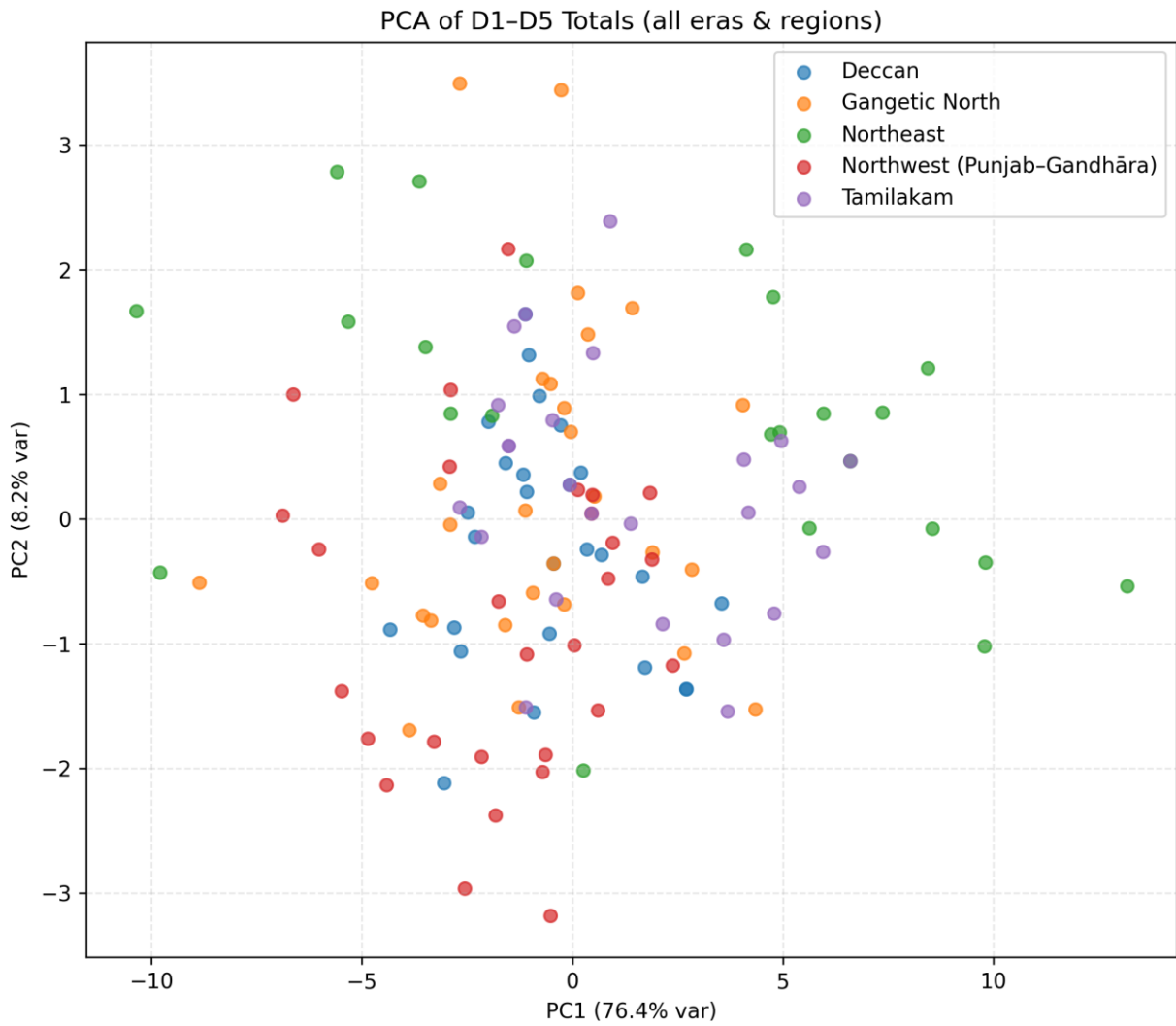
1⃞3⃞ **D1-D5 Dimensional Heatmap – Tamilakam**

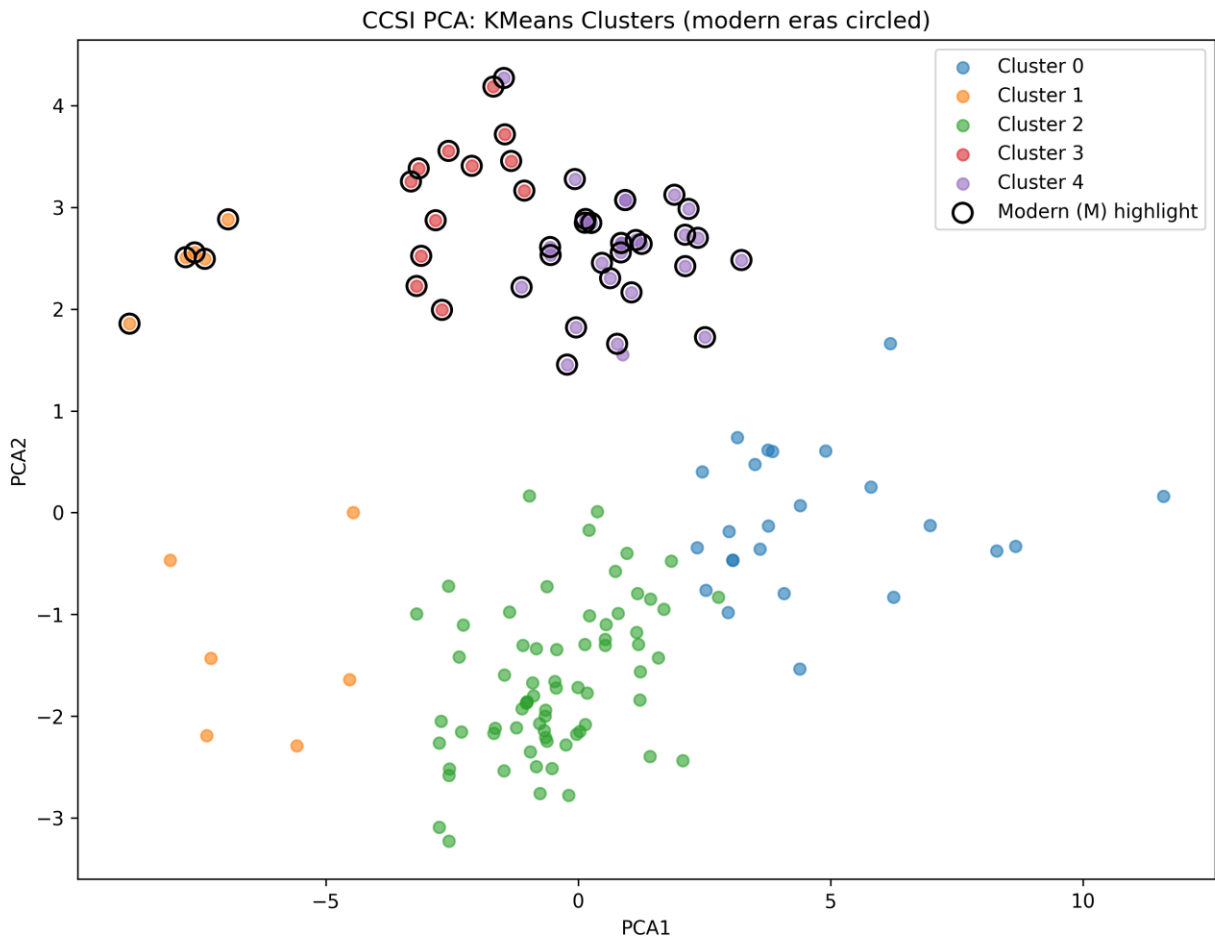D1–D5 Dimension Heatmap – Tamilakam

🔷 SECTION D — Machine Learning Outputs

1️⃣4️⃣ K-Means Clusters (k=4) on PCA Components (D1–D5 totals)

1▯5▯ PCA of D1–D5 Totals – All Eras & Regions

PCA of D1–D5 Totals (all eras & regions)

1⬚6⬚ PCA: K-Means with Modern Eras Highlighted

CCSI PCA: KMeans Clusters (modern eras circled)

1〔7〕 PCA: Historical vs Modern Eras Separation

CCSI PCA: Historical vs Modern Eras
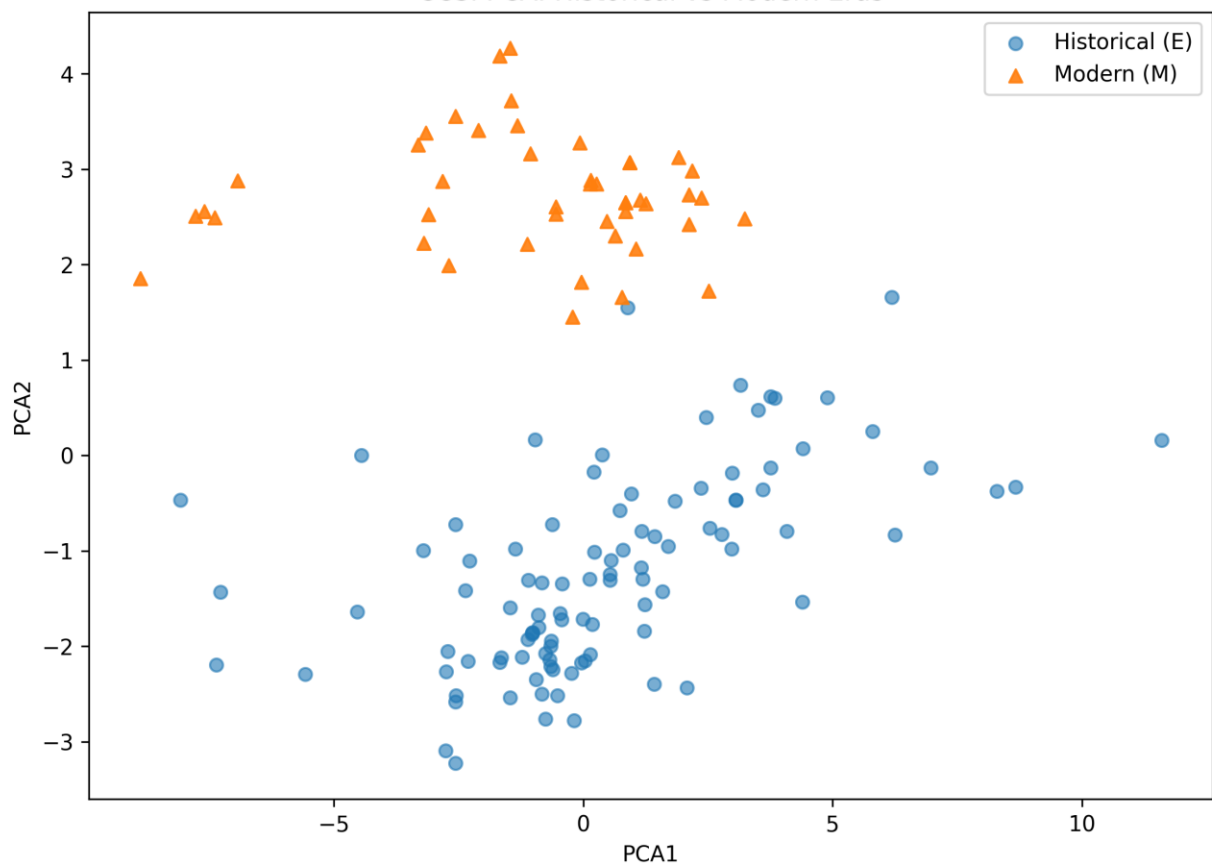
Closing Statement

This appendix is supplementary material accompanying the IEEE paper submission. It is not intended for print publication but for peer-review evaluation of dataset completeness, methodological transparency, and reproducibility of results.

All figures were generated programmatically using Python (pandas, numpy, matplotlib, seaborn, sklearn). Full code and dataset are available upon request.

— End of Graphical Appendix —