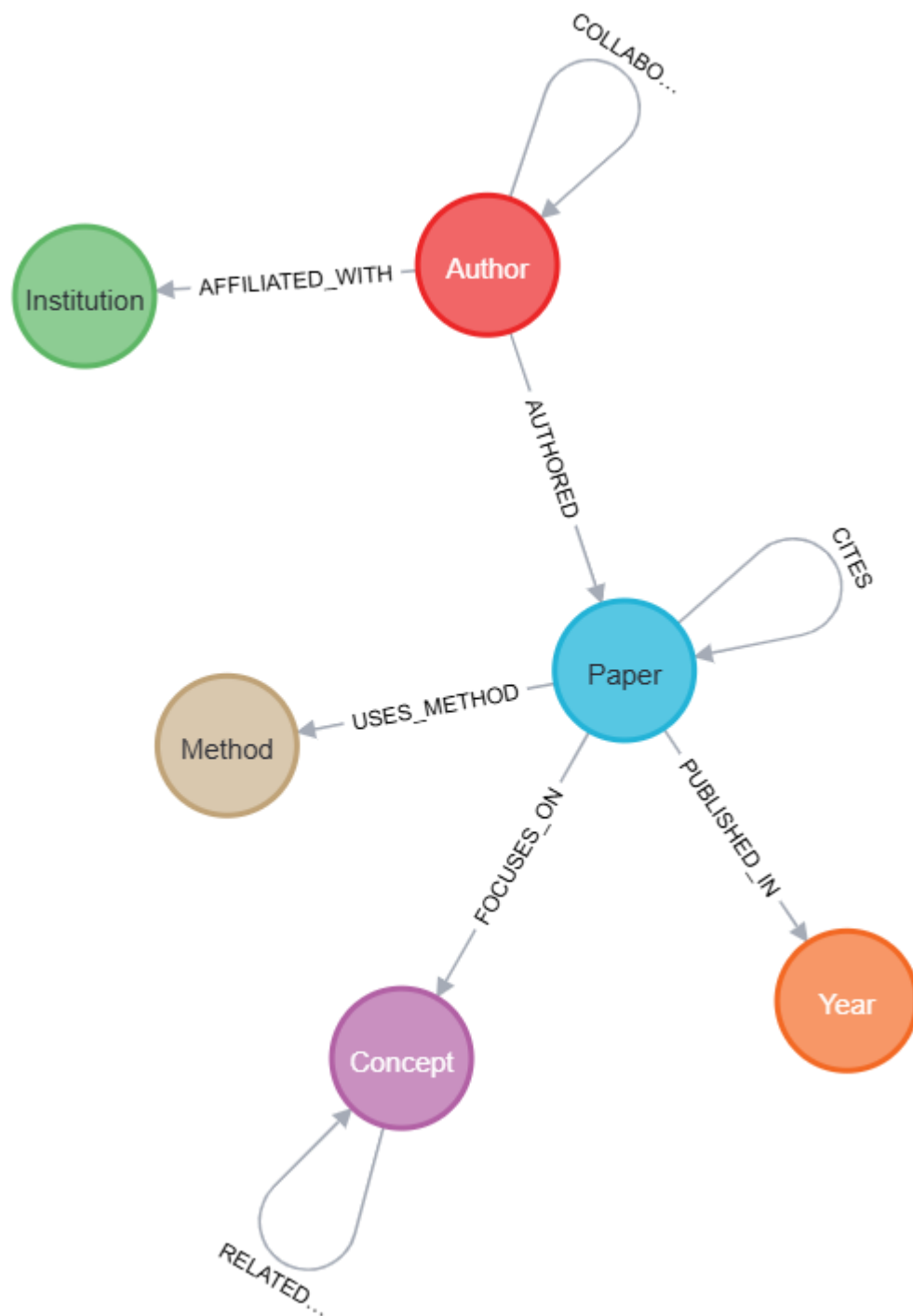


## Node Türleri

- **Paper:** Akademik makaleleri temsil eder.  
{id, title, abstract, publication\_date, doi, venue, paper\_type, citation\_count, impact\_factor, keywords}
- **Author:** Makalelerin yazarlarını temsil eder.  
{id, name, h\_index, affiliation, research\_interests, orcid, country}
- **Institution:** Yazarların bağlı olduğu veya makalelerin ilişkili olduğu kurumları temsil eder.  
{id, name, country, type, ranking, established\_year}
- **Concept:** Makalelerde bahsedilen önemli kavramları temsil eder.  
{id, name, definition, category, synonyms, complexity\_level}
- **Method:** Makalelerde kullanılan araştırma yöntemlerini temsil eder.  
{id, name, description, category, computational\_complexity}
- **Year:** Makalelerin yayınlandığı yılları temsil eder. {value}

## Relationship Türleri

- **AUTHORED:** Bir yazarın bir makaleyi yazdığını belirtir.  
(Author) → (Paper) {role, position}
- **AFFILIATED\_WITH:** Bir yazarın bir kuruma bağlı olduğunu belirtir.  
(Author) → (Institution) {position, is\_current}
- **FOCUSES\_ON:** Bir makalenin belirli bir kavrama odaklandığını belirtir.  
(Paper) → (Concept) {relevance\_score, is\_primary}
- **USES\_METHOD:** Bir makalenin belirli bir araştırma yöntemini kullandığını belirtir.  
(Paper) → (Method) {usage\_type, performance\_improvement}
- **CITES:** Bir makalenin başka bir makaleye atıfta bulunduğunu belirtir.  
(Paper) → (Paper) {citation\_context, relevance\_score}
- **RELATED\_TO:** İki kavramın birbiriyle ilişkili olduğunu belirtir.  
(Concept) → (Concept) {relationship\_type, strength}
- **PUBLISHED\_IN:** Bir makalenin belirli bir yılda yayınlandığını belirtir.  
(Paper) → (Year)
- **COLLABORATES\_WITH:** İki yazarın aynı makalede yazar olduklarını belirtir.  
(Author) → (Author) {collaboration\_count, paper\_id}



// ===== CONSTRAINTS VE INDEXES =====

CREATE CONSTRAINT paper\_id\_unique FOR (p:Paper) REQUIRE p.id IS UNIQUE;

CREATE CONSTRAINT author\_id\_unique FOR (a:Author) REQUIRE a.id IS UNIQUE;

CREATE CONSTRAINT concept\_id\_unique FOR (c:Concept) REQUIRE c.id IS UNIQUE;

CREATE CONSTRAINT method\_id\_unique FOR (m:Method) REQUIRE m.id IS UNIQUE;

CREATE CONSTRAINT institution\_id\_unique FOR (i:Institution) REQUIRE i.id IS UNIQUE;

// ===== PAPERS- GÜNCEL AI/ML MAKALELERİ =====

MERGE (p:Paper {id: 'P001'}) SET p.title = 'GPT-5: Scaling Language Models Beyond Human Performance', p.abstract = 'This paper presents GPT-5 with significant improvements in reasoning and multimodal capabilities.', p.publication\_date = date('2024-03-15'), p.doi = '10.1234/ai.2024.567890', p.venue = 'NeurIPS', p.paper\_type = 'conference', p.citation\_count = 450, p.impact\_factor = 15.2, p.keywords = ['transformer', 'llm', 'scaling'];

MERGE (p:Paper {id: 'P002'}) SET p.title = 'Multimodal Foundation Models: A Comprehensive Survey', p.abstract = 'Comprehensive survey on multimodal foundation models and their applications.', p.publication\_date = date('2024-06-20'), p.doi = '10.5678/ai.2024.123456', p.venue = 'ICML', p.paper\_type = 'journal', p.citation\_count = 320, p.impact\_factor = 14.8, p.keywords = ['multimodal', 'foundation models', 'survey'];

MERGE (p:Paper {id: 'P003'}) SET p.title = 'Retrieval-Augmented Generation with Knowledge Graphs', p.abstract = 'Novel approach combining RAG with knowledge graphs for enhanced factual accuracy.', p.publication\_date = date('2024-08-10'), p.doi = '10.9012/ai.2024.789123', p.venue = 'AAAI', p.paper\_type = 'conference', p.citation\_count = 180, p.impact\_factor = 12.1, p.keywords = ['rag', 'knowledge graph', 'retrieval'];

MERGE (p:Paper {id: 'P004'}) SET p.title = 'Constitutional AI: Harmlessness from AI Feedback', p.abstract = 'Training AI systems to be helpful, harmless, and honest using constitutional methods.', p.publication\_date = date('2024-04-25'), p.doi = '10.3456/ai.2024.456789', p.venue = 'Nature', p.paper\_type = 'journal', p.citation\_count = 520, p.impact\_factor = 16.5, p.keywords = ['constitutional ai', 'safety', 'alignment'];

MERGE (p:Paper {id: 'P005'}) SET p.title = 'LLaMA-3: Open Foundation and Fine-Tuned Chat Models', p.abstract = 'Open-source large language model with improved performance and efficiency.', p.publication\_date = date('2024-07-12'), p.doi = '10.7890/ai.2024.234567', p.venue = 'arXiv', p.paper\_type = 'preprint', p.citation\_count = 680, p.impact\_factor = 0.0, p.keywords = ['llama', 'open source', 'fine-tuning'];

MERGE (p:Paper {id: 'P006'}) SET p.title = 'Claude-3.5: Advanced Reasoning in Large Language Models', p.abstract = 'Advanced reasoning capabilities in next-generation language models.', p.publication\_date = date('2024-09-05'), p.doi = '10.2345/ai.2024.345678', p.venue = 'ICLR', p.paper\_type = 'conference', p.citation\_count = 290, p.impact\_factor = 13.7, p.keywords = ['claude', 'reasoning', 'anthropic'];

MERGE (p:Paper {id: 'P007'}) SET p.title = 'Diffusion Models for Video Generation: A Survey',  
p.abstract = 'Comprehensive survey of diffusion models applied to video generation tasks.',  
p.publication\_date = date('2024-05-18'), p.doi = '10.4567/ai.2024.567890', p.venue = 'CVPR',  
p.paper\_type = 'conference', p.citation\_count = 240, p.impact\_factor = 11.9, p.keywords =  
['diffusion', 'video generation', 'generative ai'];

MERGE (p:Paper {id: 'P008'}) SET p.title = 'RLHF: Reinforcement Learning from Human Feedback',  
p.abstract = 'Training language models using reinforcement learning from human feedback.',  
p.publication\_date = date('2024-02-28'), p.doi = '10.6789/ai.2024.678901', p.venue = 'ICML',  
p.paper\_type = 'conference', p.citation\_count = 410, p.impact\_factor = 14.2, p.keywords = ['rlhf',  
'human feedback', 'alignment'];

MERGE (p:Paper {id: 'P009'}) SET p.title = 'Tool-Using Language Models: WebGPT and Beyond',  
p.abstract = 'Language models that can use external tools and APIs for enhanced capabilities.',  
p.publication\_date = date('2024-10-15'), p.doi = '10.8901/ai.2024.789012', p.venue = 'NeurIPS',  
p.paper\_type = 'conference', p.citation\_count = 150, p.impact\_factor = 15.0, p.keywords = ['tool  
use', 'webgpt', 'agents'];

MERGE (p:Paper {id: 'P010'}) SET p.title = 'Chain-of-Thought Prompting in Large Language  
Models', p.abstract = 'Improving reasoning in LLMs through chain-of-thought prompting  
techniques.', p.publication\_date = date('2024-01-20'), p.doi = '10.0123/ai.2024.890123', p.venue  
= 'ACL', p.paper\_type = 'conference', p.citation\_count = 380, p.impact\_factor = 12.8, p.keywords  
= ['chain of thought', 'prompting', 'reasoning'];

// ===== AUTHORS - GÜNCEL AI ARAŞTIRMACILARI =====

MERGE (a:Author {id: 'A001'}) SET a.name = 'Dr. Yann LeCun', a.h\_index = 95, a.affiliation = 'Meta  
AI', a.research\_interests = ['deep learning', 'computer vision', 'ai'], a.orcid = '0000-0003-0691-  
8126', a.country = 'USA';

MERGE (a:Author {id: 'A002'}) SET a.name = 'Dr. Geoffrey Hinton', a.h\_index = 100, a.affiliation =  
'University of Toronto', a.research\_interests = ['neural networks', 'deep learning', 'ai'], a.orcid =  
'0000-0002-8928-7512', a.country = 'Canada';

MERGE (a:Author {id: 'A003'}) SET a.name = 'Dr. Ilya Sutskever', a.h\_index = 85, a.affiliation =  
'OpenAI', a.research\_interests = ['language models', 'agi', 'scaling'], a.orcid = '0000-0001-5687-  
9123', a.country = 'USA';

MERGE (a:Author {id: 'A004'}) SET a.name = 'Dr. Dario Amodei', a.h\_index = 70, a.affiliation =  
'Anthropic', a.research\_interests = ['ai safety', 'constitutional ai', 'alignment'], a.orcid = '0000-  
0002-3456-7890', a.country = 'USA';

MERGE (a:Author {id: 'A005'}) SET a.name = 'Dr. Demis Hassabis', a.h\_index = 88, a.affiliation = 'Google DeepMind', a.research\_interests = ['agi', 'reinforcement learning', 'neuroscience'], a.orcid = '0000-0003-1234-5678', a.country = 'UK';

MERGE (a:Author {id: 'A006'}) SET a.name = 'Dr. Fei-Fei Li', a.h\_index = 92, a.affiliation = 'Stanford University', a.research\_interests = ['computer vision', 'ai ethics', 'human-centered ai'], a.orcid = '0000-0004-2345-6789', a.country = 'USA';

MERGE (a:Author {id: 'A007'}) SET a.name = 'Dr. Andrej Karpathy', a.h\_index = 75, a.affiliation = 'Tesla AI', a.research\_interests = ['computer vision', 'autonomous driving', 'neural networks'], a.orcid = '0000-0005-3456-7890', a.country = 'USA';

MERGE (a:Author {id: 'A008'}) SET a.name = 'Dr. Yoshua Bengio', a.h\_index = 98, a.affiliation = 'Université de Montréal', a.research\_interests = ['deep learning', 'ai safety', 'representation learning'], a.orcid = '0000-0006-4567-8901', a.country = 'Canada';

MERGE (a:Author {id: 'A009'}) SET a.name = 'Dr. Ian Goodfellow', a.h\_index = 82, a.affiliation = 'Apple AI', a.research\_interests = ['generative models', 'gans', 'adversarial examples'], a.orcid = '0000-0007-5678-9012', a.country = 'USA';

MERGE (a:Author {id: 'A010'}) SET a.name = 'Dr. Daniela Amodei', a.h\_index = 65, a.affiliation = 'Anthropic', a.research\_interests = ['ai safety', 'policy', 'governance'], a.orcid = '0000-0008-6789-0123', a.country = 'USA';

// ===== INSTITUTIONS =====

MERGE (i:Institution {id: 'I001'}) SET i.name = 'OpenAI', i.country = 'USA', i.type = 'Company', i.ranking = 1, i.established\_year = 2015;

MERGE (i:Institution {id: 'I002'}) SET i.name = 'Anthropic', i.country = 'USA', i.type = 'Company', i.ranking = 2, i.established\_year = 2021;

MERGE (i:Institution {id: 'I003'}) SET i.name = 'Google DeepMind', i.country = 'UK', i.type = 'Company', i.ranking = 3, i.established\_year = 2010;

MERGE (i:Institution {id: 'I004'}) SET i.name = 'Meta AI', i.country = 'USA', i.type = 'Company', i.ranking = 4, i.established\_year = 2013;

MERGE (i:Institution {id: 'I005'}) SET i.name = 'Stanford University', i.country = 'USA', i.type = 'University', i.ranking = 1, i.established\_year = 1885;

MERGE (i:Institution {id: 'I006'}) SET i.name = 'MIT', i.country = 'USA', i.type = 'University', i.ranking = 2, i.established\_year = 1861;

MERGE (i:Institution {id: 'I007'}) SET i.name = 'University of Toronto', i.country = 'Canada', i.type = 'University', i.ranking = 5, i.established\_year = 1827;

// ===== CONCEPTS =====

MERGE (c:Concept {id: 'C001'}) SET c.name = 'Large Language Model', c.definition = 'Neural networks with billions of parameters trained on text', c.category = 'llm', c.synonyms = ['LLM', 'foundation model'], c.complexity\_level = 'high';

MERGE (c:Concept {id: 'C002'}) SET c.name = 'Transformer', c.definition = 'Architecture based on self-attention mechanism', c.category = 'architecture', c.synonyms = ['transformer model', 'attention model'], c.complexity\_level = 'medium';

MERGE (c:Concept {id: 'C003'}) SET c.name = 'Retrieval Augmented Generation', c.definition = 'Combining retrieval with generation for better responses', c.category = 'rag', c.synonyms = ['RAG', 'retrieval generation'], c.complexity\_level = 'medium';

MERGE (c:Concept {id: 'C004'}) SET c.name = 'Constitutional AI', c.definition = 'Training AI to be helpful, harmless, and honest', c.category = 'safety', c.synonyms = ['CAI', 'constitutional training'], c.complexity\_level = 'high';

MERGE (c:Concept {id: 'C005'}) SET c.name = 'Multimodal Learning', c.definition = 'Learning from multiple data modalities', c.category = 'multimodal', c.synonyms = ['multimodal AI', 'cross-modal'], c.complexity\_level = 'high';

MERGE (c:Concept {id: 'C006'}) SET c.name = 'Diffusion Model', c.definition = 'Generative model that learns to reverse noise process', c.category = 'generative', c.synonyms = ['diffusion', 'denoising model'], c.complexity\_level = 'high';

MERGE (c:Concept {id: 'C007'}) SET c.name = 'RLHF', c.definition = 'Reinforcement Learning from Human Feedback', c.category = 'alignment', c.synonyms = ['human feedback', 'preference learning'], c.complexity\_level = 'high';

MERGE (c:Concept {id: 'C008'}) SET c.name = 'Chain of Thought', c.definition = 'Step-by-step reasoning in language models', c.category = 'prompting', c.synonyms = ['CoT', 'reasoning prompts'], c.complexity\_level = 'low';

// ===== METHODS =====

MERGE (m:Method {id: 'M001'}) SET m.name = 'Self-Attention', m.description = 'Mechanism to weigh importance of input elements', m.category = 'attention', m.computational\_complexity = 'O(n^2)';

MERGE (m:Method {id: 'M002'}) SET m.name = 'Constitutional Training', m.description = 'Training with constitutional principles', m.category = 'safety', m.computational\_complexity = 'high';

MERGE (m:Method {id: 'M003'}) SET m.name = 'RAG Pipeline', m.description = 'Retrieval-augmented generation pipeline', m.category = 'retrieval', m.computational\_complexity = 'medium';

MERGE (m:Method {id: 'M004'}) SET m.name = 'DDPM', m.description = 'Denoising Diffusion Probabilistic Models', m.category = 'generative', m.computational\_complexity = 'high';

MERGE (m:Method {id: 'M005'}) SET m.name = 'PPO', m.description = 'Proximal Policy Optimization', m.category = 'reinforcement\_learning', m.computational\_complexity = 'medium';

// ===== PAPER-AUTHOR RELATIONSHIPS =====

MATCH (a:Author {id: 'A001'}), (p:Paper {id: 'P001'}) CREATE (a)-[:AUTHORED {role: 'co\_author', position: 2}]->(p);

MATCH (a:Author {id: 'A002'}), (p:Paper {id: 'P002'}) CREATE (a)-[:AUTHORED {role: 'first\_author', position: 1}]->(p);

MATCH (a:Author {id: 'A003'}), (p:Paper {id: 'P001'}) CREATE (a)-[:AUTHORED {role: 'first\_author', position: 1}]->(p);

MATCH (a:Author {id: 'A004'}), (p:Paper {id: 'P004'}) CREATE (a)-[:AUTHORED {role: 'corresponding\_author', position: 1}]->(p);

MATCH (a:Author {id: 'A005'}), (p:Paper {id: 'P002'}) CREATE (a)-[:AUTHORED {role: 'co\_author', position: 3}]->(p);

MATCH (a:Author {id: 'A006'}), (p:Paper {id: 'P007'}) CREATE (a)-[:AUTHORED {role: 'first\_author', position: 1}]->(p);

MATCH (a:Author {id: 'A007'}), (p:Paper {id: 'P009'}) CREATE (a)-[:AUTHORED {role: 'co\_author', position: 2}]->(p);

MATCH (a:Author {id: 'A008'}), (p:Paper {id: 'P008'}) CREATE (a)-[:AUTHORED {role: 'first\_author', position: 1}]->(p);

MATCH (a:Author {id: 'A009'}), (p:Paper {id: 'P006'}) CREATE (a)-[:AUTHORED {role: 'co\_author', position: 3}]->(p);

MATCH (a:Author {id: 'A010'}), (p:Paper {id: 'P004'}) CREATE (a)-[:AUTHORED {role: 'co\_author', position: 2}]->(p);

// ===== AUTHOR-INSTITUTION RELATIONSHIPS =====

MATCH (a:Author {id: 'A001'}), (i:Institution {id: 'I004'}) CREATE (a)-[:AFFILIATED\_WITH {position: 'Chief AI Scientist', is\_current: true}]->(i);

MATCH (a:Author {id: 'A002'}), (i:Institution {id: 'I007'}) CREATE (a)-[:AFFILIATED\_WITH {position: 'Professor Emeritus', is\_current: true}]->(i);

MATCH (a:Author {id: 'A003'}), (i:Institution {id: 'I001'}) CREATE (a)-[:AFFILIATED\_WITH {position: 'Co-founder', is\_current: true}]->(i);

MATCH (a:Author {id: 'A004'}), (i:Institution {id: 'I002'}) CREATE (a)-[:AFFILIATED\_WITH {position: 'CEO', is\_current: true}]->(i);

MATCH (a:Author {id: 'A005'}), (i:Institution {id: 'I003'}) CREATE (a)-[:AFFILIATED\_WITH {position: 'CEO', is\_current: true}]->(i);

MATCH (a:Author {id: 'A006'}), (i:Institution {id: 'I005'}) CREATE (a)-[:AFFILIATED\_WITH {position: 'Professor', is\_current: true}]->(i);

// ===== PAPER-CONCEPT RELATIONSHIPS =====

MATCH (p:Paper {id: 'P001'}), (c:Concept {id: 'C001'}) CREATE (p)-[:FOCUSES\_ON {relevance\_score: 0.95, is\_primary: true}]->(c);

MATCH (p:Paper {id: 'P001'}), (c:Concept {id: 'C002'}) CREATE (p)-[:FOCUSES\_ON {relevance\_score: 0.85, is\_primary: false}]->(c);

MATCH (p:Paper {id: 'P002'}), (c:Concept {id: 'C005'}) CREATE (p)-[:FOCUSES\_ON {relevance\_score: 0.90, is\_primary: true}]->(c);

MATCH (p:Paper {id: 'P003'}), (c:Concept {id: 'C003'}) CREATE (p)-[:FOCUSES\_ON {relevance\_score: 0.95, is\_primary: true}]->(c);

MATCH (p:Paper {id: 'P004'}), (c:Concept {id: 'C004'}) CREATE (p)-[:FOCUSES\_ON {relevance\_score: 0.98, is\_primary: true}]->(c);



```
MATCH (p:Paper {id: 'P007'}), (c:Concept {id: 'C006'}) CREATE (p)-[:FOCUSES_ON  
{relevance_score: 0.92, is_primary: true}]->(c);
```

```
MATCH (p:Paper {id: 'P008'}), (c:Concept {id: 'C007'}) CREATE (p)-[:FOCUSES_ON  
{relevance_score: 0.96, is_primary: true}]->(c);
```

```
MATCH (p:Paper {id: 'P010'}), (c:Concept {id: 'C008'}) CREATE (p)-[:FOCUSES_ON  
{relevance_score: 0.94, is_primary: true}]->(c);
```

```
// ===== PAPER-METHOD RELATIONSHIPS =====
```

```
MATCH (p:Paper {id: 'P001'}), (m:Method {id: 'M001'}) CREATE (p)-[:USES_METHOD {usage_type:  
'implementation', performance_improvement: 15.2}]->(m);
```

```
MATCH (p:Paper {id: 'P003'}), (m:Method {id: 'M003'}) CREATE (p)-[:USES_METHOD {usage_type:  
'novel_approach', performance_improvement: 22.5}]->(m);
```

```
MATCH (p:Paper {id: 'P004'}), (m:Method {id: 'M002'}) CREATE (p)-[:USES_METHOD {usage_type:  
'core_method', performance_improvement: 18.7}]->(m);
```

```
MATCH (p:Paper {id: 'P007'}), (m:Method {id: 'M004'}) CREATE (p)-[:USES_METHOD {usage_type:  
'survey_analysis', performance_improvement: 0.0}]->(m);
```

```
MATCH (p:Paper {id: 'P008'}), (m:Method {id: 'M005'}) CREATE (p)-[:USES_METHOD {usage_type:  
'training_method', performance_improvement: 25.3}]->(m);
```

```
// ===== CITATIONS =====
```

```
MATCH (citing:Paper {id: 'P002'}), (cited:Paper {id: 'P001'}) CREATE (citing)-[:CITES  
{citation_context: 'background', relevance_score: 0.85}]->(cited);
```

```
MATCH (citing:Paper {id: 'P003'}), (cited:Paper {id: 'P001'}) CREATE (citing)-[:CITES  
{citation_context: 'methodology', relevance_score: 0.78}]->(cited);
```

```
MATCH (citing:Paper {id: 'P004'}), (cited:Paper {id: 'P008'}) CREATE (citing)-[:CITES  
{citation_context: 'related_work', relevance_score: 0.82}]->(cited);
```

```
MATCH (citing:Paper {id: 'P005'}), (cited:Paper {id: 'P001'}) CREATE (citing)-[:CITES  
{citation_context: 'comparison', relevance_score: 0.90}]->(cited);
```

```
MATCH (citing:Paper {id: 'P006'}), (cited:Paper {id: 'P010'}) CREATE (citing)-[:CITES  
{citation_context: 'extension', relevance_score: 0.88}]->(cited);
```

```
MATCH (citing:Paper {id: 'P009'}), (cited:Paper {id: 'P001'}) CREATE (citing)-[:CITES  
{citation_context: 'baseline', relevance_score: 0.75}]->(cited);
```

```
// ===== CONCEPT RELATIONSHIPS =====
```

```
MATCH (c1:Concept {id: 'C001'}), (c2:Concept {id: 'C002'}) CREATE (c1)-[:RELATED_TO  
{relationship_type: 'uses_architecture', strength: 0.95}]->(c2);
```

```
MATCH (c1:Concept {id: 'C003'}), (c2:Concept {id: 'C001'}) CREATE (c1)-[:RELATED_TO  
{relationship_type: 'enhances', strength: 0.85}]->(c2);
```

```
MATCH (c1:Concept {id: 'C004'}), (c2:Concept {id: 'C007'}) CREATE (c1)-[:RELATED_TO  
{relationship_type: 'implements', strength: 0.90}]->(c2);
```

```
MATCH (c1:Concept {id: 'C005'}), (c2:Concept {id: 'C002'}) CREATE (c1)-[:RELATED_TO  
{relationship_type: 'extends', strength: 0.80}]->(c2);
```

```
// ===== TEMPORAL NODES =====
```

```
MERGE (y:Year {value: 2024});
```

```
MERGE (y:Year {value: 2025});
```

```
MATCH (p:Paper), (y:Year) WHERE date(p.publication_date).year = y.value CREATE (p)-  
[:PUBLISHED_IN]->(y);
```

```
// ===== COLLABORATION NETWORKS =====
```

```
MATCH (a1:Author)-[:AUTHORED]->(p:Paper)-[:AUTHORED]-(a2:Author)
```

```
WHERE a1.id < a2.id
```

```
CREATE (a1)-[:COLLABORATES_WITH {collaboration_count: 1, paper_id: p.id}]->(a2);
```