

Can Generative AI Truly Innovate?

Building Imaginative AI through the Theory of Cross-SVD and Human Thought

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世界の幸せをカタチにする。

Creating Peace & Happiness for the World



Musashino University

ICAIAAC2026, Imphal, India, 2-5 August 2026

Contents

- What is **Generative AI**
 - Why we are so exciting with today LLMs performance!!
 - What are missing in the Generative AI
- Fulfilling the Generative AI by the concepts of Sati, Sampajañña, and **SAR**
- **Human thought process**, revisit
- Process of life (Five aggregates (ขันธห้า / Khandha))
 - Life and Self are understood as processes rather than fixed entities
 - Khandha and Computational Model of Human Thought Process
- How **Imaginative Model** works
- Conclusion

Why we are so exciting with today LLMs performance!!

This is because of:

- High flexibility due to their parametric model
- Human-like interaction enabled by context-aware processing
- Knowledge-like integration from large-scale training data
- Natural language-guided prompting, rather than requiring formal knowledge representation or reasoning frameworks
- Ease of use and accessibility

What Are LLMs Missing?

Let's Find Out by Examining the **Human Thought Process**.

Experience Making Payments at a POS Terminal → Choosing a Payment Method



Sati (सती)

“The ability to be aware of what is happening in the present moment.”

In a Metacognitive perspective:

“State of knowing what you know.”

Experience Making Payments at a POS Terminal → Figuring out how to pay



Sampajaṭṭiā
(สัมปชัญญะ)

“Clear comprehension of what you are doing and why.”
or “Wisely knowing how to act in context.”

In a Metacognitive perspective:

“State of knowing how to reach what you know.”

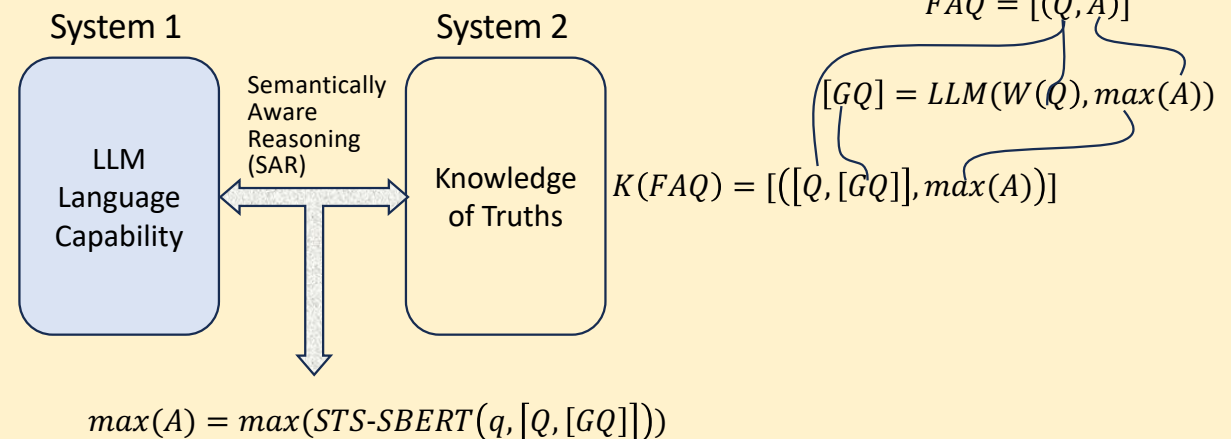
Semantically Aware Reasoning (SAR)

- Virach Sornlertlamvanich. **Enhancing Large Language Models: Alleviating Knowledge Deficiency with External Knowledge and Semantically Aware Reasoning (SAR)**. Knowledge and Information Systems, Springer Nature, pp. 1–19, 2025, doi: 10.1007/s10115-025-02485-4.

First attempt to bring Sati back to an LLM!!

In a dual-process architecture, the large language model (LLM) serves as **System 1** to handle intuitive processing, while **System 2** utilizes structured knowledge to support logical decision-making.

Semantically Aware Reasoning (SAR)



SAR model is proposed to overcome the drawbacks of LLM hallucination and the RAG knowledge adding model

Explanation from Three Perspectives on the Evolution of Artificial Intelligence

- **Data-driven AI**

Learning from past data; predicting the present based on past events

- **From Big Data to Streaming Data**

An era is coming where only surface-level data can be observed!!

- **Toward Conscious AI**

Addressing System 2 tasks which are done consciously.

From Big data to Streaming data

- Compared to “**knowledge**,” the world of “**ignorance**” is far greater.
- An era is coming when we will only be able to observe “**superficial data**”!!

⇒ Predict and model the data of ignorance. A complete model can never be created.



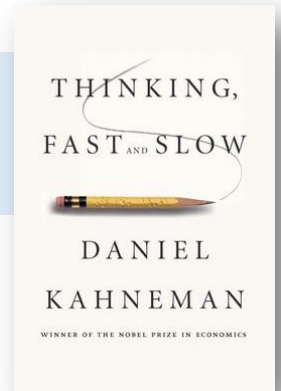
無知
Ignorance
อวิชชา *Avidya*



$$Wisdom \approx \frac{Knowledge}{Ignorance}$$

Wisdom is like the ratio between knowledge and ignorance

Theories of Human thought process (Toward Conscious AI)



Daniel Kahneman, in his book “Thinking, Fast and Slow”, explains that human thinking operates mainly through two systems.

System 1 is the mechanism for "thinking fast," instantly handling many of the judgments we make in daily life.

- Fast
- **UNCONSCIOUS**
- Automatic
- Everyday Decisions
- Non-linguistic
- Intuitive
- Error Prone

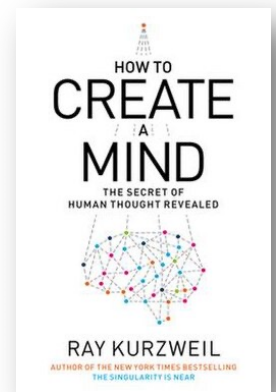
System 2 is the mechanism for "thinking slowly and deeply," used for making reliable decisions and solving complex problems.

- Slow
- **CONSCIOUS**
- Effortful
- Complex Decisions
- Linguistic
- Analytical
- Reliable

Theories of Human thought process

(Toward Conscious AI)

- *Yoshua Bengio* emphasizes the need to extend deep learning from System 1 capabilities to **System 2 tasks (which are done consciously)**—such as *reasoning, planning, capturing causality and obtaining systematic generalization in natural language processing*—to achieve the broader goal of **discovering structured knowledge**, and empowered by the functions of **attention & consciousness**.
- *Ray Kurzweil* further explains that the human neocortex functions as a **hierarchical pattern recognition system**, building abstract understanding by composing simpler patterns into higher-level concepts.
- A path toward conscious AI can be framed through metacognitive stages: **Consciousness (Sati)**—knowing what you know, or meta-knowledge and mindfulness—and **Awareness (Sampajañña)**—the ability to apply what you know with clear comprehension and context.



Five Aggregates (Khandha) ชั้น 5

The components of human existence consisting of physical form and mind

Five Aggregates (Khandha) refers to the combination of components that make up **the process of life**. It is also called “**form and mind**” (body and mind). These are processes that arise and function together and cannot be completely separated.

They consist of:

- 1. Form (Rūpa)** — the physical body or material form
- 2. Feeling (Vedanā)** — sensations or feelings
- 3. Perception (Saññā)** — consciousness
- 4. Mental Formations (Saṅkhāra)** — awareness
- 5. Understanding (Viññāṇa)** — clear understanding

Computational Model of Human Thought Process

State of Cognition in Human Thought Process

The 5 progressive levels in the development of understanding or insight, the transformation of Cogniton.

The Five States of Mind Enlightenment

เบญจวิชา (Benjavitcha)

Five Aggregates

- Rūpa รูป (กาย)
- Vedanā เวทนา (ความรู้สึก)
- Saññā สัญญา (ความจำ)
- Saṅkhārā สังขาร (สิ่งปรุงแต่ง)
- Viññāṇa วิญญาณ (ความรู้แจ้ง)

1. Data/Information データ, 情報

Sensing what you observe

2. Knowledge 知識

Understanding what you observe

3. Consciousness 気づき, メタ知識

Knowing what you know / Meta-Knowledge, Mindfulness

4. Awareness 理解、明覚

Ability to reach what you know / Clear comprehension

5. Enlightenment 悟り

Knowledge creation

ข้อมูล

ความรู้

สติ (Sati, ความระลึกได้)

สัมปชัญญะ (Sampajañña, ความรู้สึกรู้ตัว)

ปัญญา, ตรัสรู้

Beyond Generative Models, Imagination Brings Creativity

The Ceiling of Current AI

- Reasoning is Not Enough

LLM+RAG answers

Correlation

“Retrieval-Augmented Generation for Knowledge-Intensive NLP Tasks”, Lewis et al., 2020



SAR corrects answer

Reasoning

“Enhancing Large Language Models: Alleviating Knowledge Deficiency with External Knowledge and Semantically Aware Reasoning (SAR)”, Virach Sornlertlamvanich Knowledge and Information, Systems, **Springer Nature**, pp. 1–19, 2025, doi: 10.1007/s10115-025-02485-4.

No creation!!

No new knowledge!!

What is Imagination in AI?

Imagination is ...

- Not generating arbitrary ideas
- Not hallucinating
- Not recalling memories verbatim

What we are looking for:

Imagination is

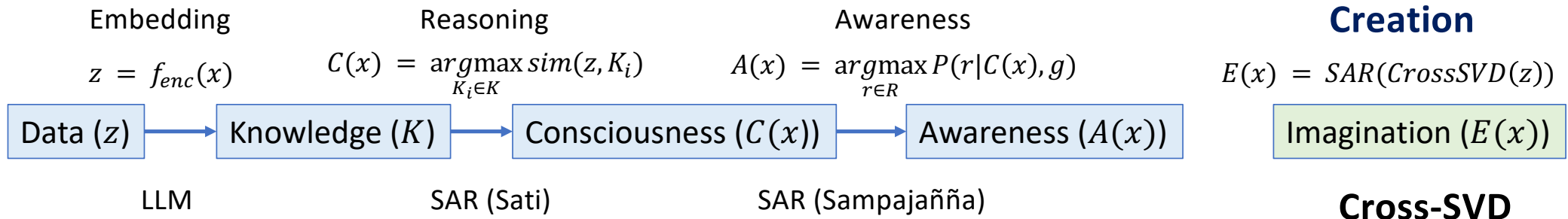
- **Structured transformation and recombination of knowledge across domains**

Thought Process Pipeline

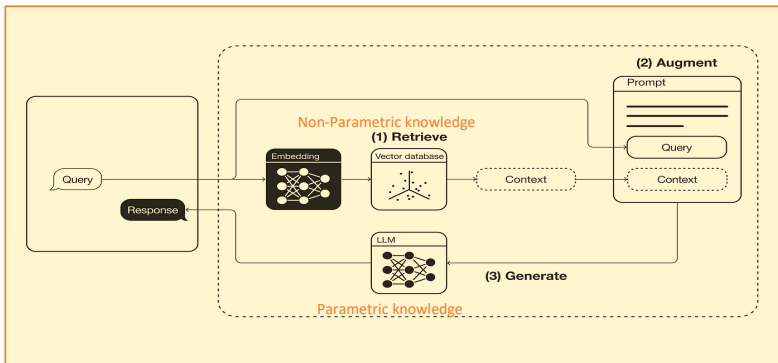
Computational Model of Human Thought Process

x : Query
 f_{enc} : Multimodal encoder (CLIP)
 $K = \{K_1, \dots, K_n\}$: Knowledge base
 $r \in R$: Reasoning paths
 g : Goal

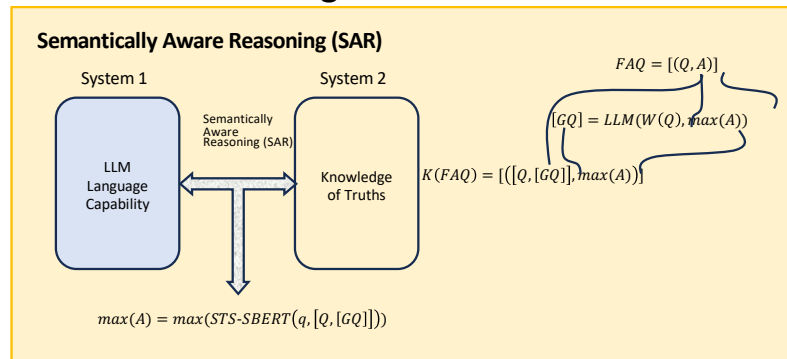
- Five Stages of Mind Enlightenment in guided interpretation



Answers more



Validates knowledge & Select the best answers

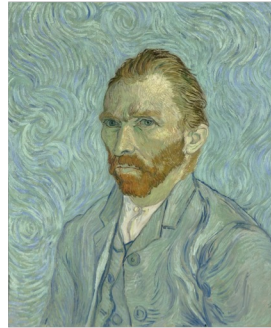


Cross-Domain Mapping +
 Structural Preservation +
 SAR Validation (i.e.
 Common Sense Model,
 World Model)

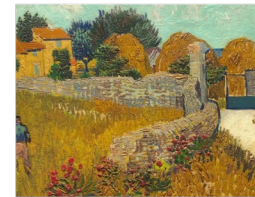
Cross-Domain Imagination

Imagination can be realized through cross-domain knowledge transfer

Vincent van
Gogh as an artist



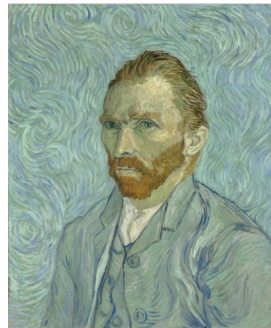
1. Wheat Field with Cypresses (1889)
2. The Bedroom (1888)
3. The Starry Night (1889)
4. Green Wheat Fields (1889–1890)
5. Farmhouse in Provence (1888)
6. Sunflowers (1888–1889)



Cross-Domain Imagination

Imagination can be realized through cross-domain knowledge transfer

Vincent van
Gogh as an artist



Imaginative model



Vincent van
Gogh as a chef



1. Wheat Field with Cypresses (1889)
2. The Bedroom (1888)
3. The Starry Night (1889)
4. Green Wheat Fields (1889–1890)
5. Farmhouse in Provence (1888)
6. Sunflowers (1888–1889)



What masterpiece dish would Vincent van Gogh craft if he translated his impasto textures and emotional intensity into food?



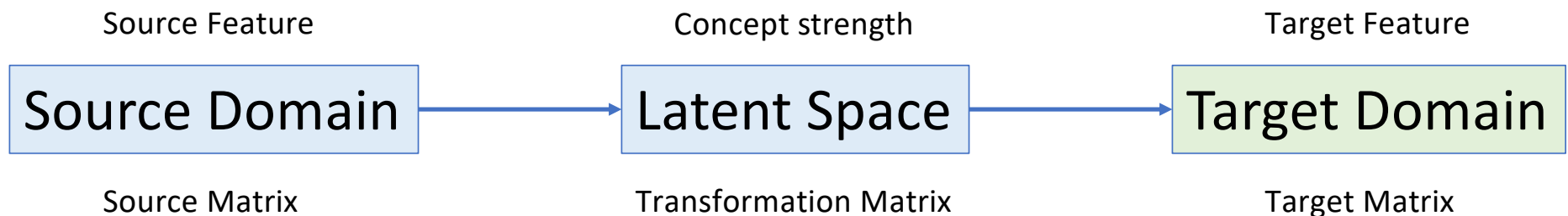
Expertise Matrix Decomposition

- Creativity from a collection of human expertise
- **SVD (Singular Value Decomposition)**
decomposes **expertise matrix (A)** into **latent concept space (captured by U and V)** and the **importance of each concept (captured by Σ)**

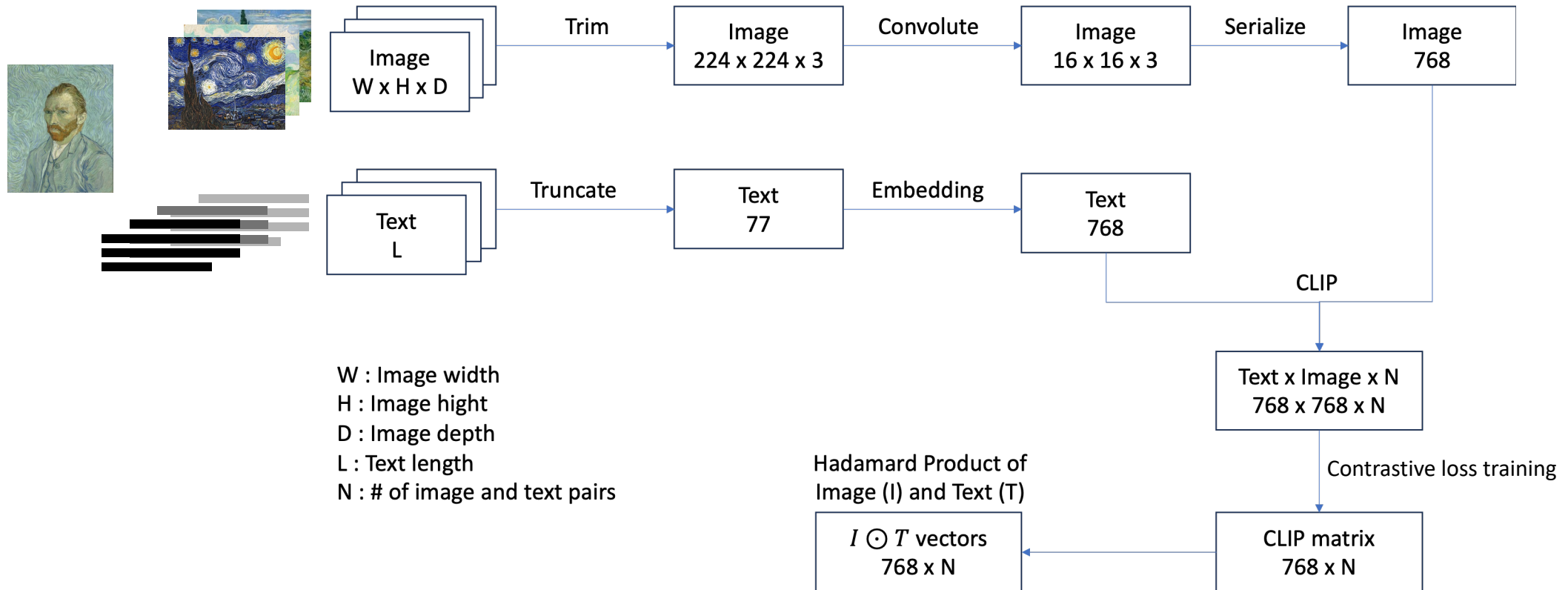
$$A = U\Sigma V^T$$

Cross-SVD

- Content is not copied across the domain—but its latent structure is transformed.
- Structure is preserved, meaning is reinterpreted



Persona Achievement Matrix (PAM) Preparation using CLIP (Contrastive Language-Image Pre-training)

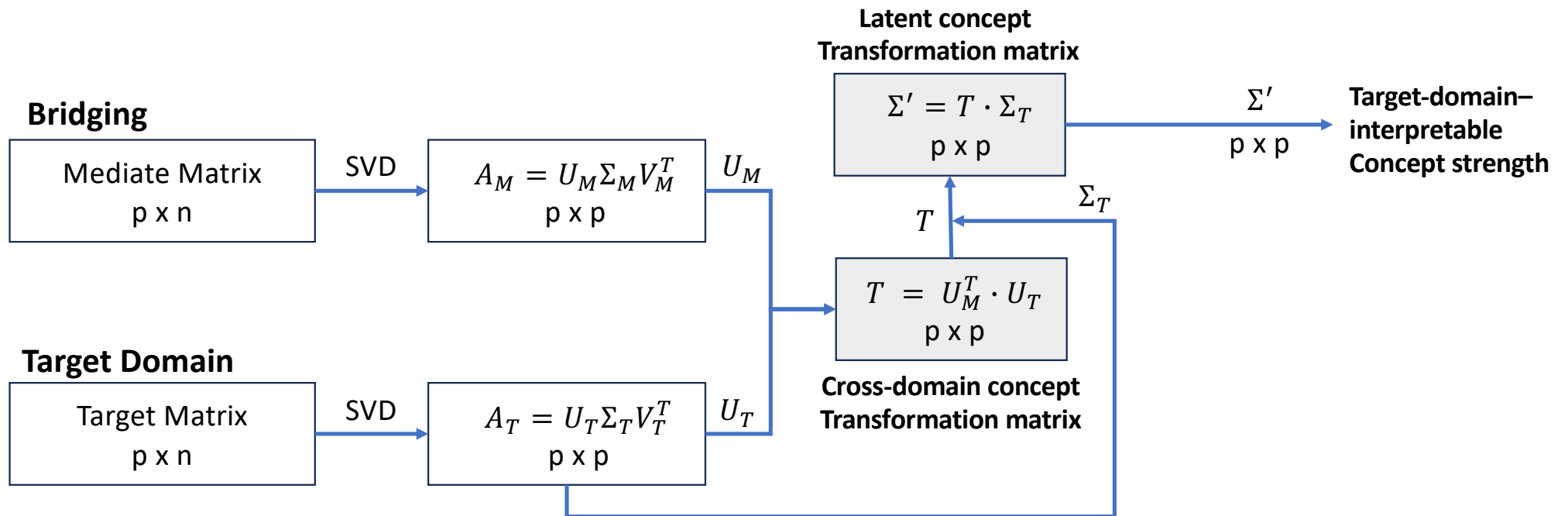


Cross-SVD

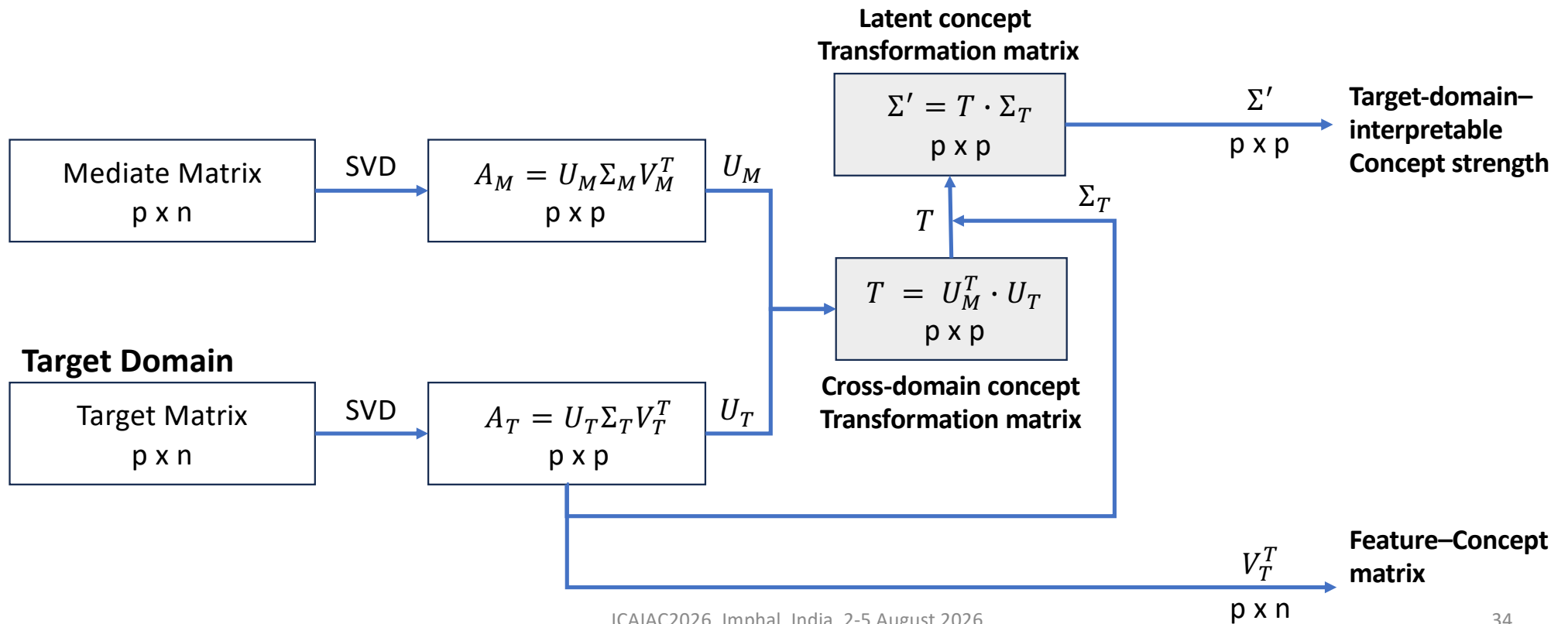
Source Domain



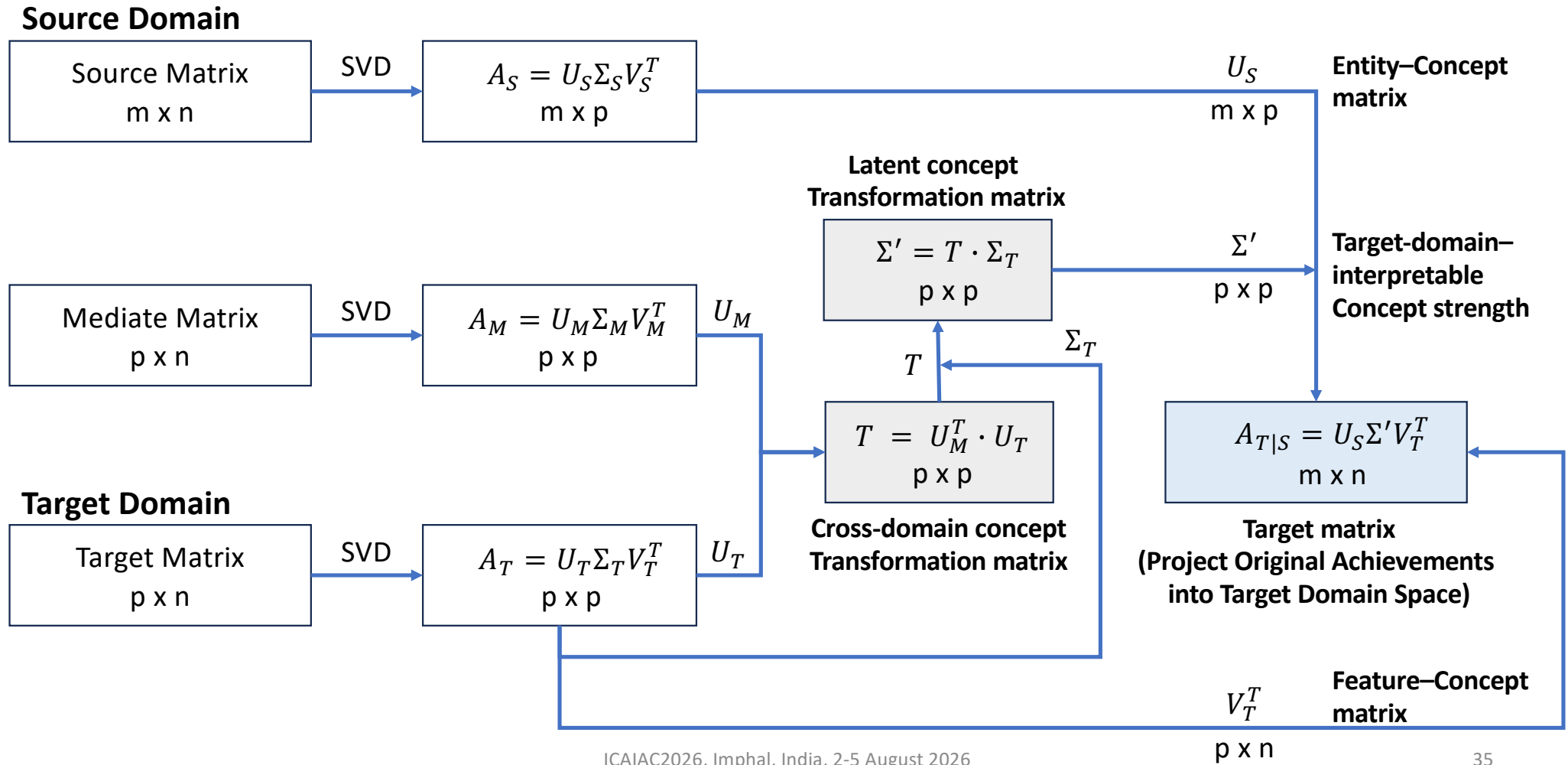
Cross-SVD



Cross-SVD



Cross-SVD



Cross-SVD

Latent concept
Transformation matrix

Source Left Singular Value

Target Right Singular Value

$$A_{T|S} = U_S \Sigma' V_T^T$$

m x n

Target matrix
(Project Original Achievements
into Target Domain Space)

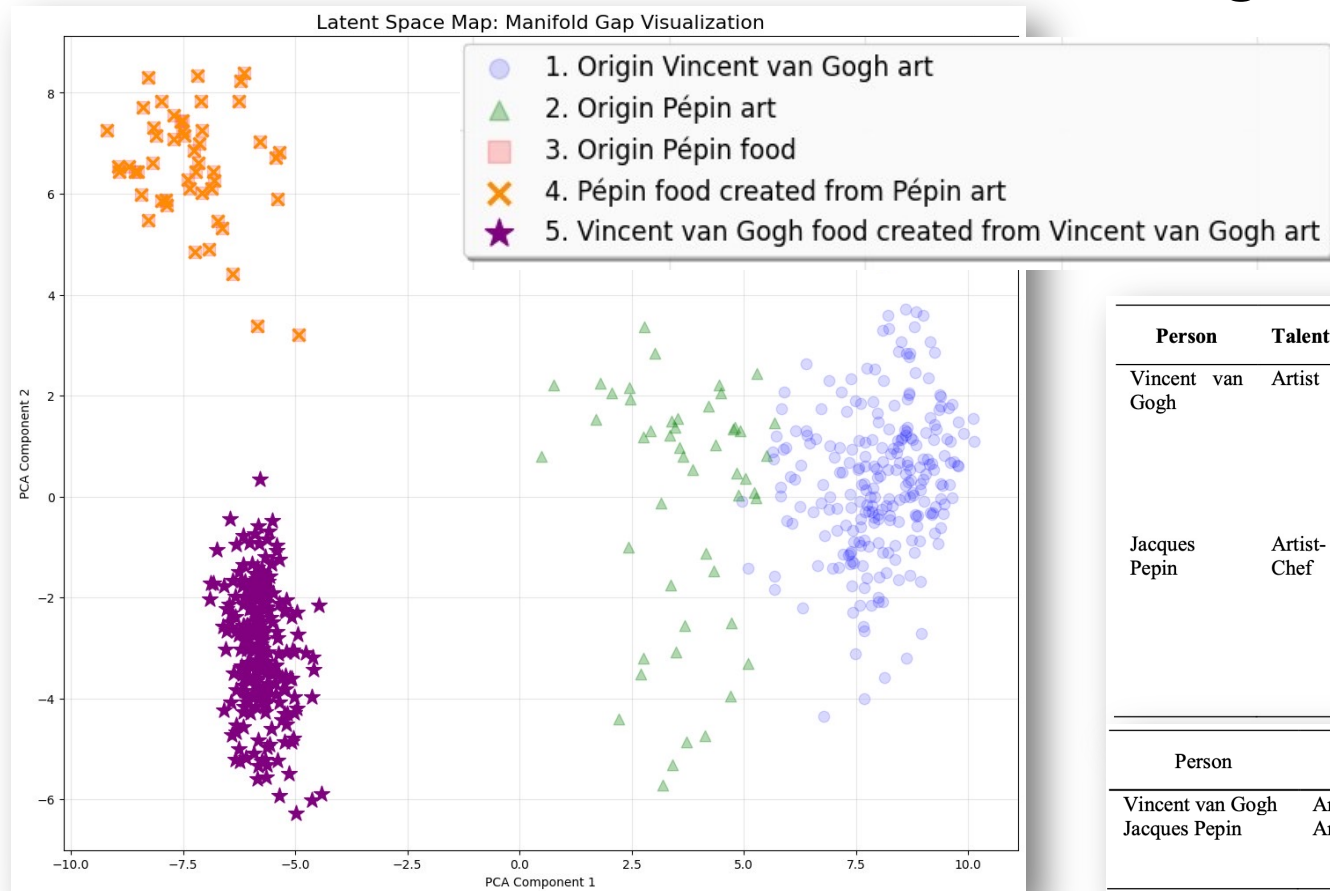
$$A_{T|S} = U_S \Sigma' V_T^T$$

m x n

Target matrix
(Project Original Achievements
into Target Domain Space)

Cross-SVD based Cross-Domain Imagination

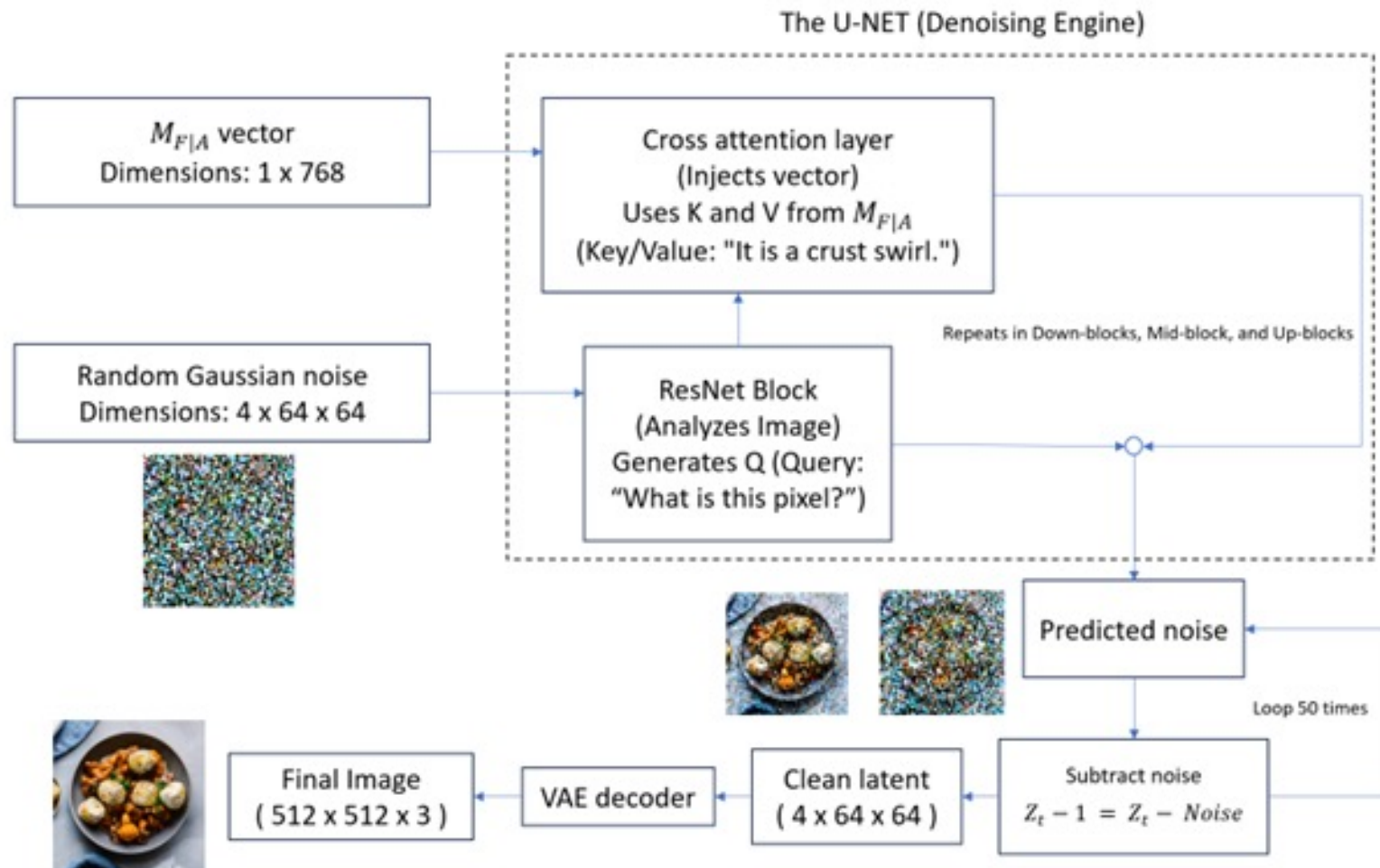
Imagination from Art to Food



Person	Talent	Style	Era	Example	
Vincent van Gogh	Artist	Post-Impressionist	Late 19 th century		
Jacques Pepin	Artist-Chef	Culinary: Classic French Art: Whimsical and colorful illustration	Mid-20 th Century - present		

Person	Talent	Image data	Text data
Vincent van Gogh	Artist	~200	From painting description
Jacques Pepin	Artist-Chef	~100 (painting + dishes)	Dish description & recipe + interview on chef and artist perspective

Visual Realization by U-NET and VAE



Cross-SVD based Cross-Domain Imagination



JP: Beef Stew in Red Wine Sauce

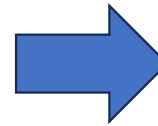
<https://www.foodandwine.com/beef-stew-in-red-wine-sauce-6418792>



JP: Abstract Scene

<https://jacquespepinart.com/shop/abstract-scene>

Cross-SVD with UNET



JP: Imagined Dish based on Abstract Scene

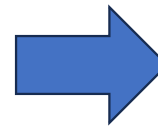
We are not generating images—but we are generating concepts



VG: Still Life with Quinces

https://commons.wikimedia.org/wiki/File:Vincent_van_Gogh_-_Still_Life_with_Quinces_-_Google_Art_Project.jpg

Cross-SVD with UNET



VG: Imagined Dish based on Still Life with Quinces

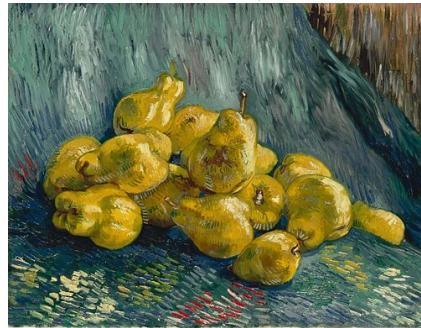
Imaginative Model vs Normal Prompt

Without structure, imagination collapses into hallucination.



My actual lunch at U of Vaasa,
EJC2026

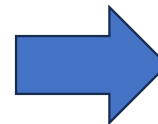
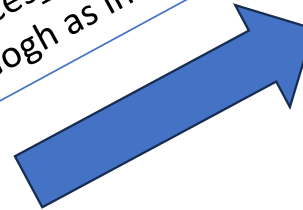
Prompt
"Create Beef Stew in Red Wine Sauce of
Jacques Pépin's style in the artistic style of
Still_Life_Quinces_1888 painting made by
Vincent van Gogh as in the attached file."



VG: Still Life with Quinces

https://commons.wikimedia.org/wiki/File:Vincent_van_Gogh_-_Still_Life_with_Quinces_-_Google_Art_Project.jpg

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Cross-SVD with UNET



VG: Imagined Dish based on
Still Life with Quinces

- 1. $U_p S_p V_p$
- 2. $V_p \leftrightarrow S_p$
- 3. $U_v S' V'_p$
- 4. $V'_p \leftrightarrow S_p$
- 5. $V'_p \leftrightarrow S_v$

- $U_a (U_f U_a^T) S V_f$
- $U_f S V_f \sim U'_f S' V'_f$

- 3. $U_v S' V'_p \Rightarrow$ key vector
- 4. $V'_p \leftrightarrow S_p \Rightarrow$ key vector $\sim S_p$
- 5. $V'_p \leftrightarrow S_v \Rightarrow$ key vector $\sim S_v$

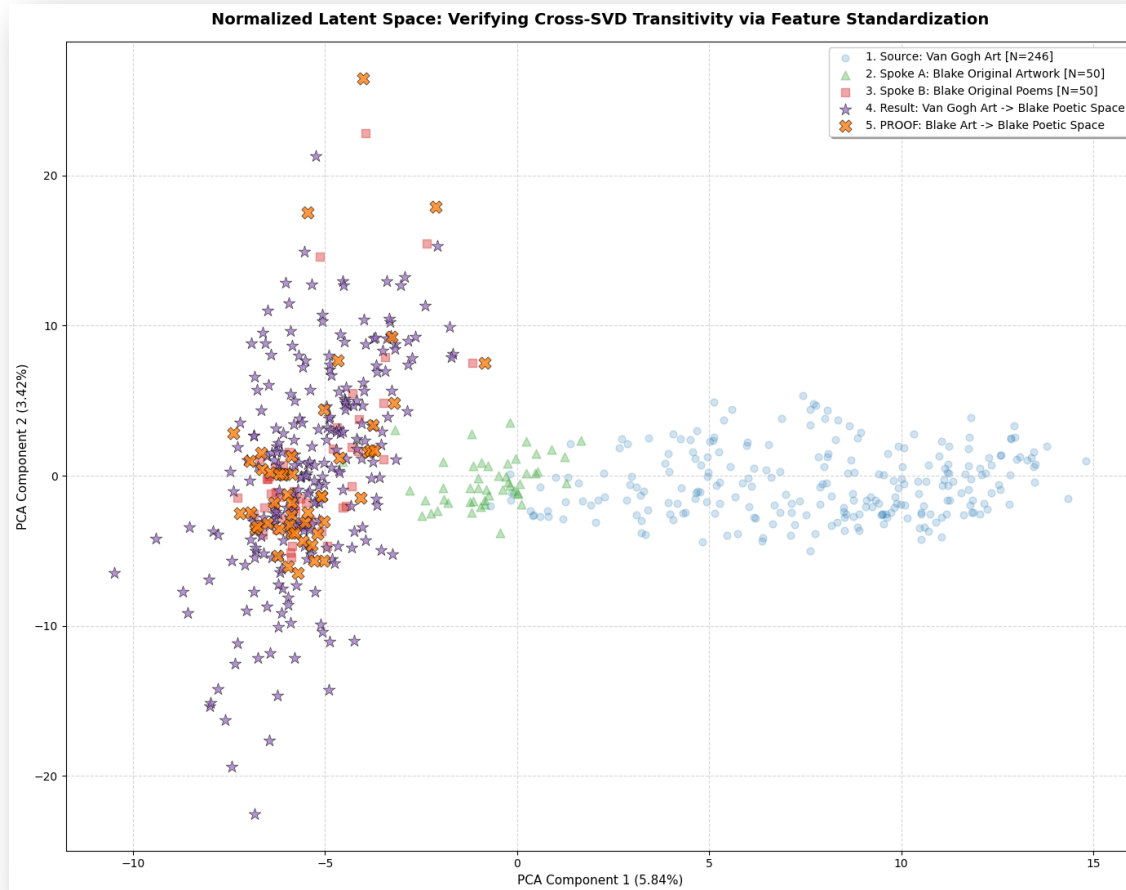
- Cross SVD P-P

- Brown Stew
 - $P_{\text{stew}} \wedge \text{Brown Stew} \sim 1$

- Cross SVD V-P

- Yellow Stew
 - $V_{\text{yellow garlic}} \wedge \text{Yellow Stew} > 0$
 - $P_{\text{stew}} \wedge \text{Yellow Stew} > 0$
- Green mango
 - $V_{\text{yellow garlic}} \wedge \text{Green mango} \sim 0$
 - $P_{\text{stew}} \wedge \text{Green mango} \sim 0$

Cross-SVD based Cross-Domain Imagination



Imagination from Art to Poem

- 1. Source: Van Gogh Art [N=246]
- 2. Spoke A: Blake Original Artwork [N=50]
- 3. Spoke B: Blake Original Poems [N=50]
- 4. Result: Van Gogh Art -> Blake Poetic Space
- 5. PROOF: Blake Art -> Blake Poetic Space

Person	Talent	Style	Era	Example
Vincent van Gogh	Artist	Post-Impressionist	Late 19 th century	
William Blake	Poet-Artist	Visual Art: Romanticism / Visionary British Art Literature: Romantic Poetry	Late 18 th – Early 19 th century	

Person	Talent	Image data	Text data
Vincent van Gogh	Artist	~200	From painting description
William Blake	Poet-Artist	~100 (Illuminated prints, watercolor paintings, and engravings)	Poems, prophetic books, and letters

1. LLM generated Poem

A midnight sky of swirling fire,
Spun from the depths of wild desire, The
cosmos rolls in blinding light,
To conquer the material night.

The silent town is locked in sleep, While
holy, cosmic oceans sweep;
The steeple points a silver hand,
To realms no mortals understand.

A somber cypress, black and high,
Reaches to pierce the burning sky
— A living flame of earthly woe,
Where stars like golden furnaces glow.

Oh Van Gogh! in thy frenzied sight,
The canvas breathes prophetic light;
Through rolling hills and vortex spun, The
starry night and soul are one.

Influenced by

- The Tyger
- The Chimney Sweeper
- London



2. Cross-SVD guided LLM generated Poem

The swirling sky is inscribed deep,
Where thoughtless stars their vigils keep;
Through the blue night the whisperings roll,
To wake the sleep of the human soul.

What unknown hand has spun the light,
To chase the dull, unprolific night?
A silent presence breathes and glows,
And through the brush a river flows.

From dark cypress to the eternity high,
The spirit leaps into the sky;
A sudden joy, a fierce delight,
Blazes across the coming night.

The hills are tossed like stormy seas,
Before the breath of futurity's breeze;
The cosmos burns, the shadows break,
And all the stars of heaven awake.

Influenced by

- The First Book of Urizen
- The Marriage of Heaven and Hell
- Songs of Experience

LLM-Based Literary Critique of the Poems

1. LLM generated Poem

Generating text that sounds convincing but lacks the true structural depth of the source material. Then the final stanza is the culprit. It drops the mythic mask and writes a standard poem about Van Gogh, rather than inhabiting the visionary mind that William Blake and Vincent van Gogh actually shared.



2. Cross-SVD guided generated Poem

While Vincent van Gogh painted The Starry Night from the window of his asylum room in Saint-Rémy, looking out at a world he felt deeply isolated from. William Blake's style reframes that isolation. It turns a lonely night-watch into a moment of triumph, where the painter's brushstrokes become the literal laws of a waking universe.

Version 2 is noticeably closer to the spirit of William Blake than the previous one. It captures not only the imagery of The Starry Night but also some of Blake's characteristic habits of questioning, spiritual vision, and dynamic energy. However, it still reveals interesting tensions between Blake's poetic method and Vincent van Gogh's visual style.

LLM Cross-SVD

Aspect	Poem 1 Score	Poem 2 Score	Difference	Comments
Blakean Questioning	5/10	9/10	+4.0	Poem 2 adopts Blake's interrogative style ("What unknown hand..."), whereas Poem 1 mainly makes assertions.
Blakean Symbolism	8/10	8.5/10	+0.5	Both employ symbolic objects (stars, cypress, night), but Poem 2 integrates them more naturally into a visionary framework.
Blakean Contraries	4/10	6/10	+2.0	Poem 2 introduces some tension between awakening and darkness, though still lacks Blake's full dialectic of opposites.
Blakean Diction	6/10	7.5/10	+1.5	Poem 2 is somewhat closer to Blake's prophetic tone, though both retain Romantic vocabulary not typical of Blake.
Van Gogh Motion	8/10	9/10	+1.0	Poem 2 has stronger kinetic verbs ("roll," "leaps," "tossed," "burns").
Van Gogh Emotional Landscape	8/10	9/10	+1.0	Poem 2 better transforms landscape into emotional and spiritual states.
Van Gogh Color Palette	5/10	5/10	0.0	Both poems underutilize Van Gogh's rich blues, yellows, and chromatic contrasts.
Van Gogh Vortex / Spiral Energy	8.5/10	7/10	-1.5	Poem 1's "swirling fire" and "vortex spun" more directly evoke <i>The Starry Night's</i> spiral sky.
Brushstroke Energy	6/10	8/10	+2.0	Poem 2's rhythm and verb choices better mimic Van Gogh's energetic brushwork.
Poetic Craftsmanship	8/10	8.5/10	+0.5	Both are well-structured; Poem 2 feels slightly more cohesive.
Fusion of Blake & Van Gogh	7.5/10	8.5/10	+1.0	Poem 2 achieves a stronger integration of Blakean spirituality and Van Goghian movement.

LLM-Based Evaluation

Category	Poem 1	Poem 2
Blakean Qualities (avg.)	5.8/10	7.8/10
Van Gogh Qualities (avg.)	7.1/10	7.6/10
Overall Artistic Fusion	7.5/10	8.5/10

LLM-Based Evaluation

- Poem 1 is stronger as a description of Van Gogh's painting. It captures the swirling sky, cypress flame, and cosmic spectacle more directly.
- Poem 2 is stronger as a Blake-inspired poem about Van Gogh's painting. It introduces the central Blakean element of visionary questioning, develops a theme of spiritual awakening, and creates a more energetic and prophetic voice.
- Faithfulness to The Starry Night → Poem 1 wins
- Faithfulness to Blake's poetic method → Poem 2 wins
- Best fusion of Blake and Van Gogh → Poem 2 wins overall by roughly one full point.

Conclusion

- **LLM** exhibits remarkable language fluency and serve as highly efficient information compressors, lacking the metacognitive functions required for reliable reasoning
- **SAR** introduces a reasoning layer that enhances the reliability of generative models and represents a preliminary step toward reflective cognition
- **Five States of Mind Enlightenment** offer a coherent framework for interpreting these gaps
- **Buddhist Inspired AI** inspires a breakthrough to approach human intelligence
- The future of AI is not just answering questions. It is **creating new ways of thinking**.

LLM can answer

SAR corrects answer

Computational Model of
Human thought process