Normalizing Flows and Variational Autoencoders

Koray Gecimli   Hajar Fatane   Elias Brand

University of Osnabrück

27 6, 2025

Topics

1. **Normalizing Flows**

2. **Variational Autoencoders**

3. **Results**

4. **Conclusions**

Normalizing Flows

Introduction

The CleanEasy Beamer theme provides a clean, professional look for academic and business presentations.

Key features:

- Clean, minimalist design
- Carefully chosen color scheme
- Professional typography
- Flexible block environments
- Customizable footers and section pages

About this template

This presentation serves as both documentation and demonstration, showing the various elements and features available in the CleanEasy theme.

Block environments

Example block

Example blocks can be used to showcase code, examples, or case studies.

Alert block

Alert blocks draw attention to critical information, warnings, or caveats.

Theorem

In a right-angled triangle, the square of the hypotenuse equals the sum of squares of the other two sides.

Definition

A prime number is a natural number greater than 1 that cannot be formed by multiplying two smaller natural numbers.

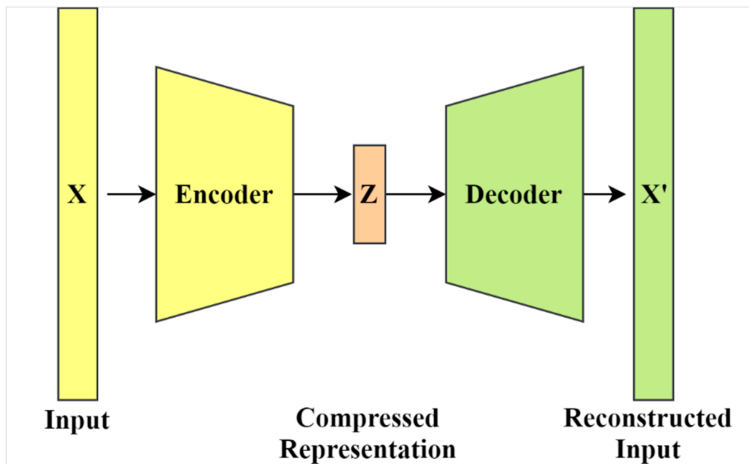# Variational Autoencoders

What are Autoencoders?

Figure: (Elbattah et al., 2021)

Autoencoders as a statistics problem

Bulleted list:

- First level item
  - Second level item
  - Another second level
    - Third level item
- Another first level item

Numbered list:

1. First step
   1.1 Substep one
   1.2 Substep two
2. Second step
3. Third step

Tables

Table: Sample table with booktabs style

Header 1	Header 2	Header 3
Row 1, Col 1	Row 1, Col 2	123.45
Row 2, Col 1	Row 2, Col 2	67.89
Row 3, Col 1	Row 3, Col 2	456.78

Table styling

The CleanEasy theme works well with the booktabs package for professional-looking tables. Simple color alterations make tables more readable without being distracting.

Mathematical Equations

The CleanEasy theme includes proper mathematical typesetting:

$$E = mc^2 \tag{1}$$

$$F = G\frac{m_1 m_2}{r^2} \tag{2}$$

Maxwell's equations in differential form:

$$\nabla \cdot \vec{E} = \frac{\rho}{\varepsilon_0} \tag{3}$$

$$\nabla \cdot \vec{B} = 0 \tag{4}$$

$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t} \tag{5}$$

$$\nabla \times \vec{B} = \mu_0 \vec{J} + \mu_0 \varepsilon_0 \frac{\partial \vec{E}}{\partial t} \tag{6}$$

Inline equations like $E = mc^2$ are also properly rendered.

Code Listings

```python
# A simple Python function
def fibonacci(n):
    """Return the nth Fibonacci number"""
    if n <= 0:
        return 0
    elif n == 1:
        return 1
    else:
        a, b = 0, 1
        for _ in range(2, n + 1):
            a, b = b, a + b
        return b

# Calculate the 10th Fibonacci number
result = fibonacci(10)
print(f"The 10th Fibonacci number is {result}")
```
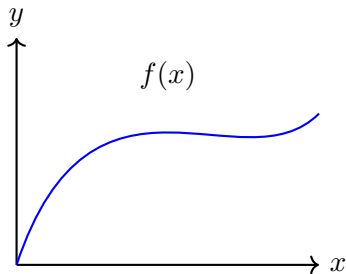
Figures and Graphics

Figure: Sample placeholder image

Figure: Simple TikZ diagram

Results

Overlays and Animations

Beamer supports step-by-step revelations:

- First point appears on slide 1

Overlays and Animations

Beamer supports step-by-step revelations:

- First point appears on slide 1
- Second point appears on slide 2

This text appears after a pause.

Overlays and Animations

Beamer supports step-by-step revelations:

- First point appears on slide 1
- Second point appears on slide 2
- Third point appears on slide 3

This text appears after a pause.

Overlays and Animations

Beamer supports step-by-step revelations:

- First point appears on slide 1
- Second point appears on slide 2
- Third point appears on slide 3

This text appears after a pause.
And this content appears on slide 4.

Overlays and Animations

Beamer supports step-by-step revelations:

- First point appears on slide 1
- Second point appears on slide 2
- Third point appears on slide 3

This text appears after a pause.
And this content appears on slide 4.

Delayed Block
This entire block appears only on slide 5.

Citations and References

CleanEasy works well with bibliographies and citations:

Sample citation

According to Einstein [1], space and time are relative.

Bibliography management

The theme is compatible with BibTeX, BibLaTeX, and other bibliography management tools.
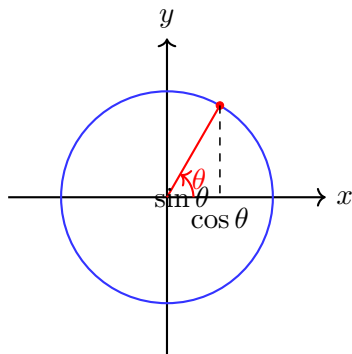
Custom TikZ Graphics

Figure: The unit circle with trigonometric functions

Conclusions

Theme Customization

The CleanEasy theme can be easily customized:

- Edit `beamercolorthemeCleanEasy.sty` to change colors
- Modify `beamerfontthemeCleanEasy.sty` for different fonts
- Adjust `beamerinnerthemeCleanEasy.sty` for layout changes
- Update `configs.tex` for footer and section page customization

Important Note

Always maintain consistent design elements throughout your presentation for a professional look.

Final Thoughts

Benefits of CleanEasy

- Professional appearance suitable for academic and business contexts
- Careful attention to typography and spacing
- High readability with suitable contrast ratios
- Flexible design that works with different content types

The CleanEasy theme is designed to let your content shine without distractions

Thank you!

your@email.com

`https://someurl.com`

References

📄 Albert Einstein. *On the Electrodynamics of Moving Bodies*. Annalen der Physik, 1905.

📄 Till Tantau. *The Beamer Class*. https://ctan.org/pkg/beamer