

The image features a complex fractal background with a color gradient from black on the left to bright yellow on the right. The fractal consists of intricate, branching patterns in shades of orange, red, and green. A large, solid black circle is positioned on the left side, containing the word "Fraktale" in a bold, yellow, sans-serif font. The fractal patterns appear to be generated from a circular base, with smaller, similar structures repeating at different scales.

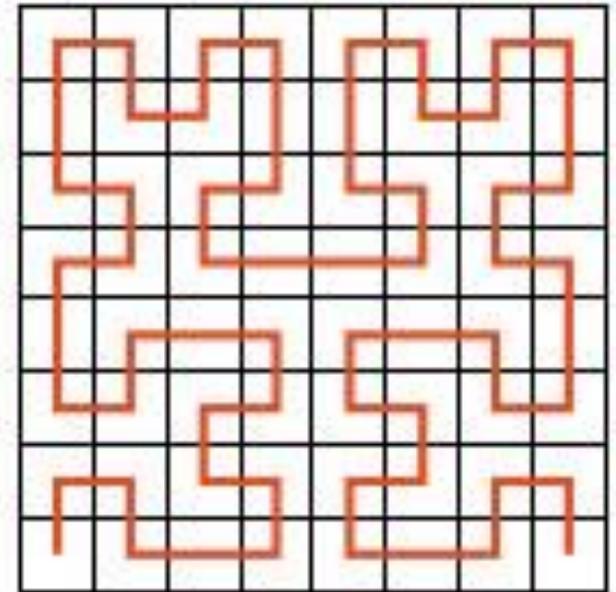
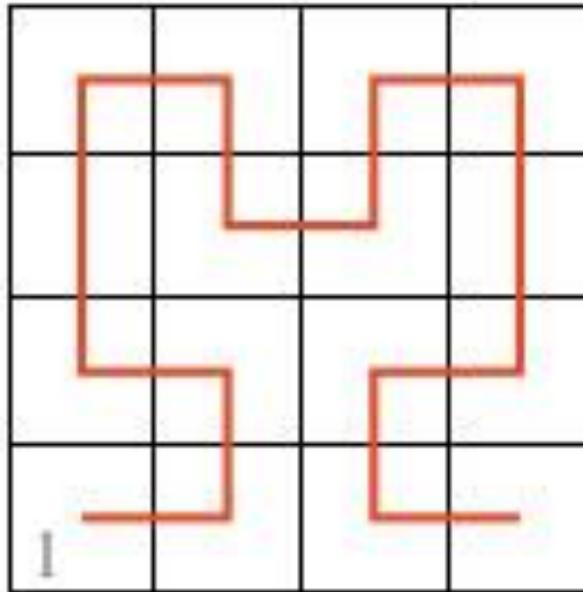
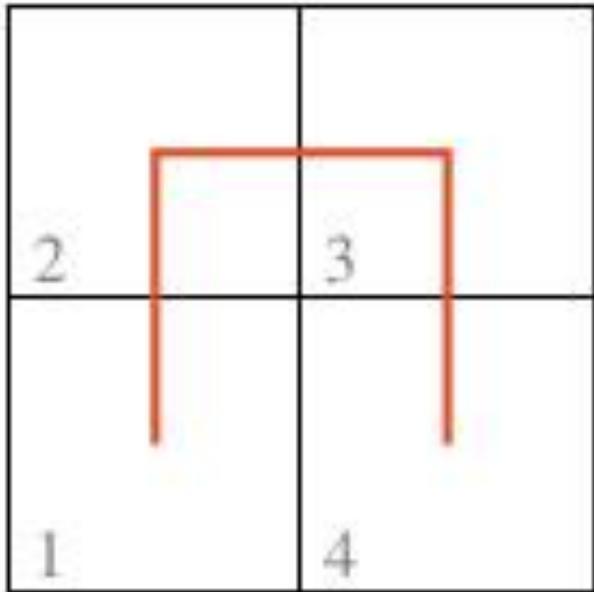
Fraktale

Was ist ein Fraktal?

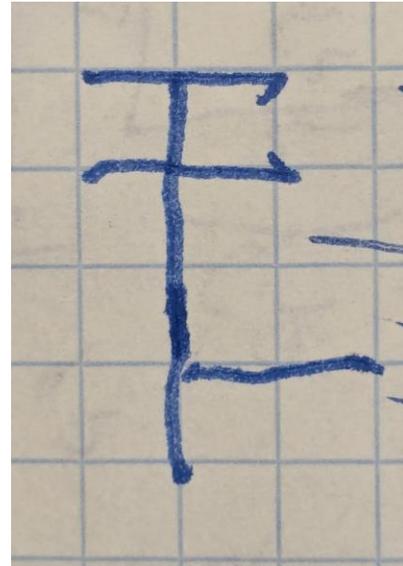
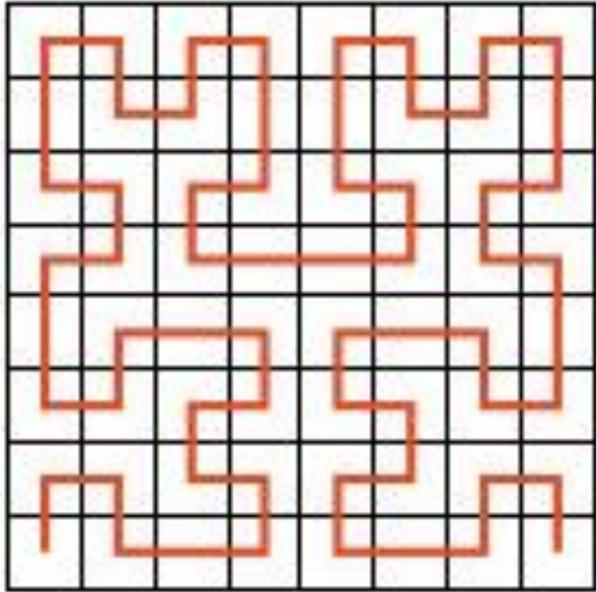
- Wiederholdende Strukturen
- Einfache Regeln
- Unendliche Detailtreue

Unser Ziel ist es, daraus resultierend ein Kompressionsverfahren zu entwickeln, das aus jedem Bild jedes andere machen kann

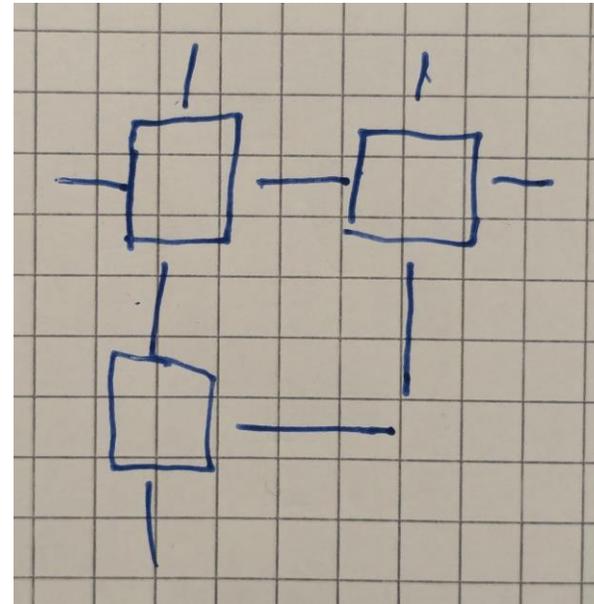
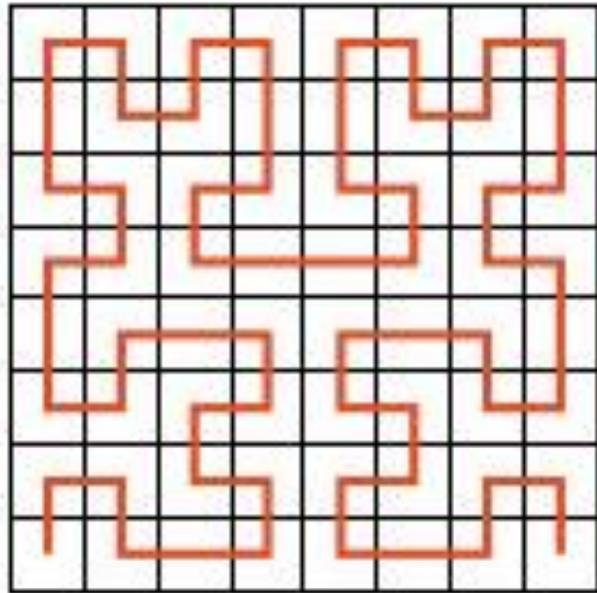
Wie kann ich Fraktale beschreiben?



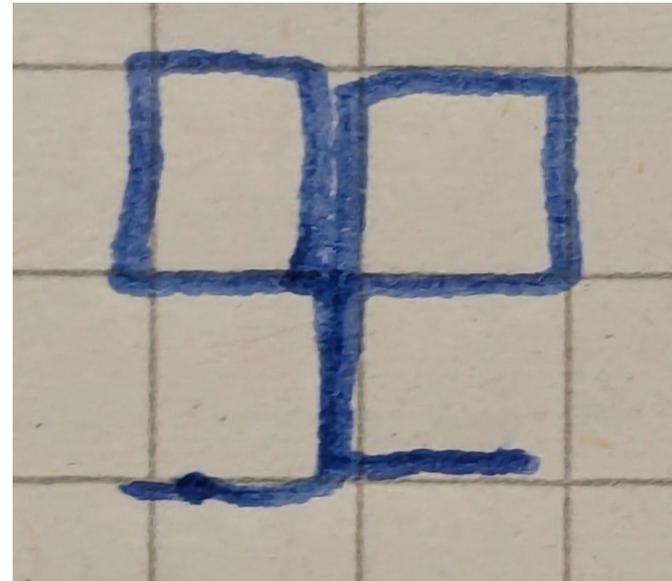
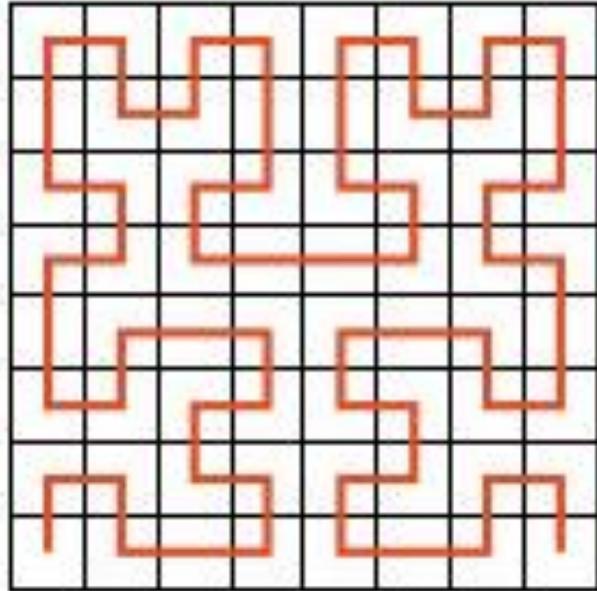
Wie kann ich Fraktale beschreiben?



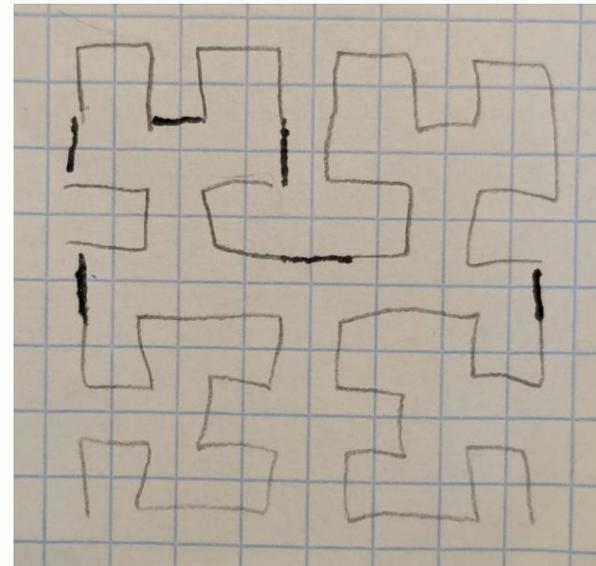
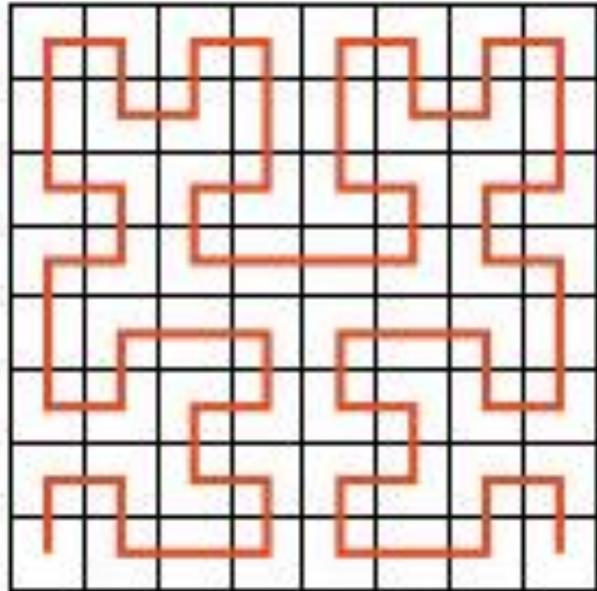
Wie kann ich Fraktale beschreiben?



Wie kann ich Fraktale beschreiben?



Wie kann ich Fraktale beschreiben?



Was ist ein IFS?

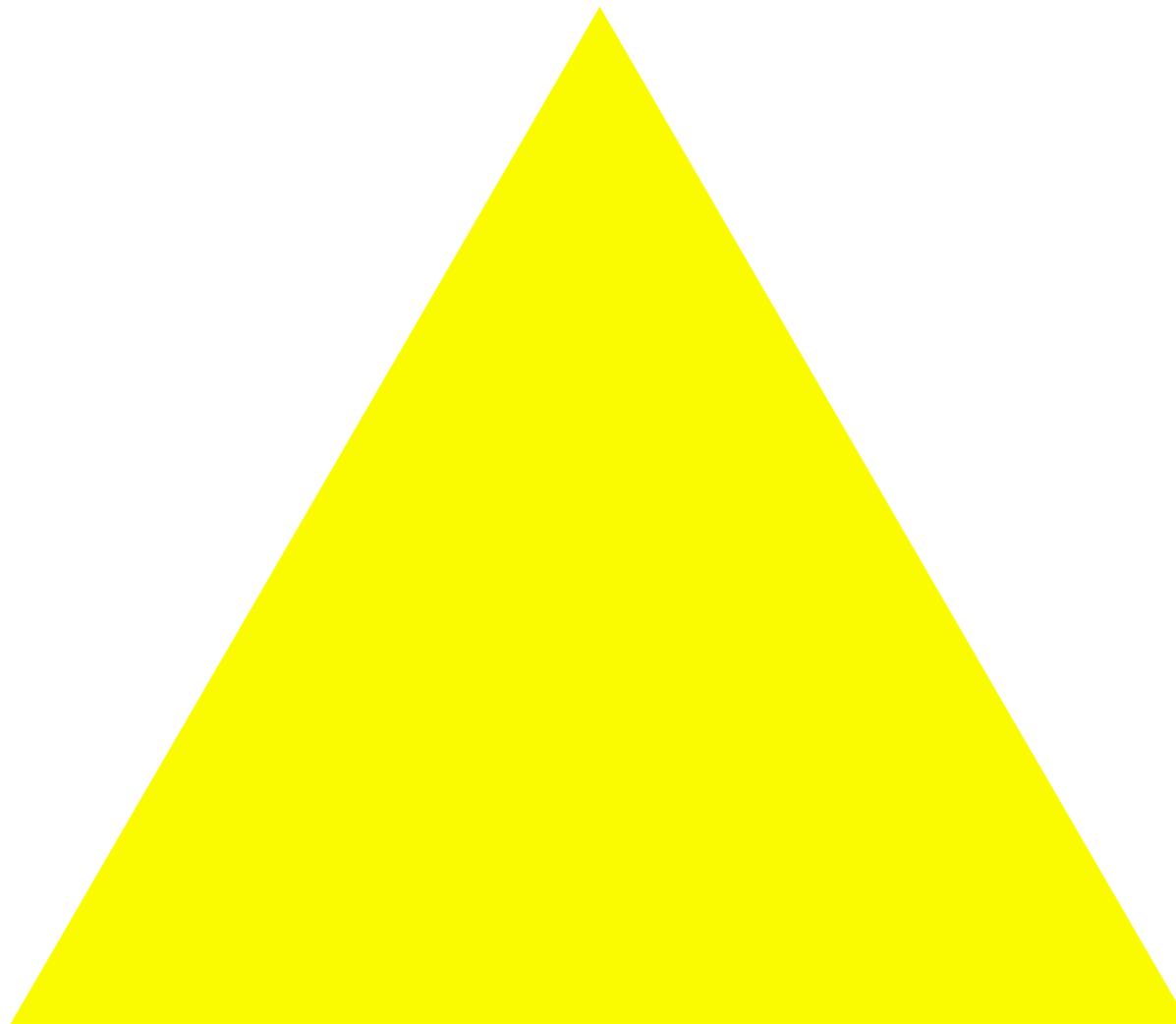
- IFS \rightarrow Iteratives Funktionen System
- JEDES Fraktal hat IFS
- n. Iteration im IFS \rightarrow n. Ordnung des Fraktals

Funktionen des IFS

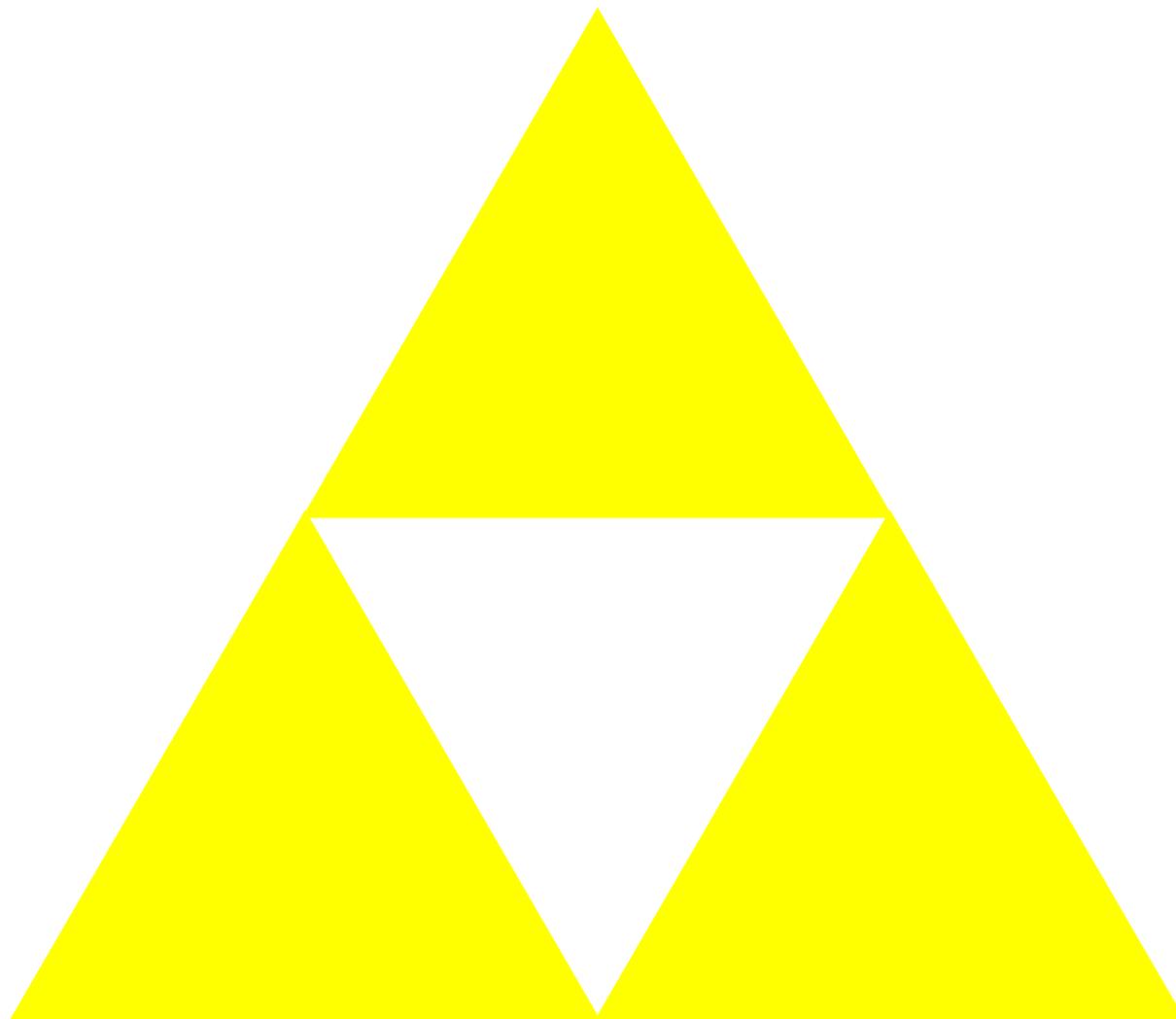
IFS besteht aus Transformationen wie...

- Verschiebung
- Skalierung
- Drehung
- Spiegelung

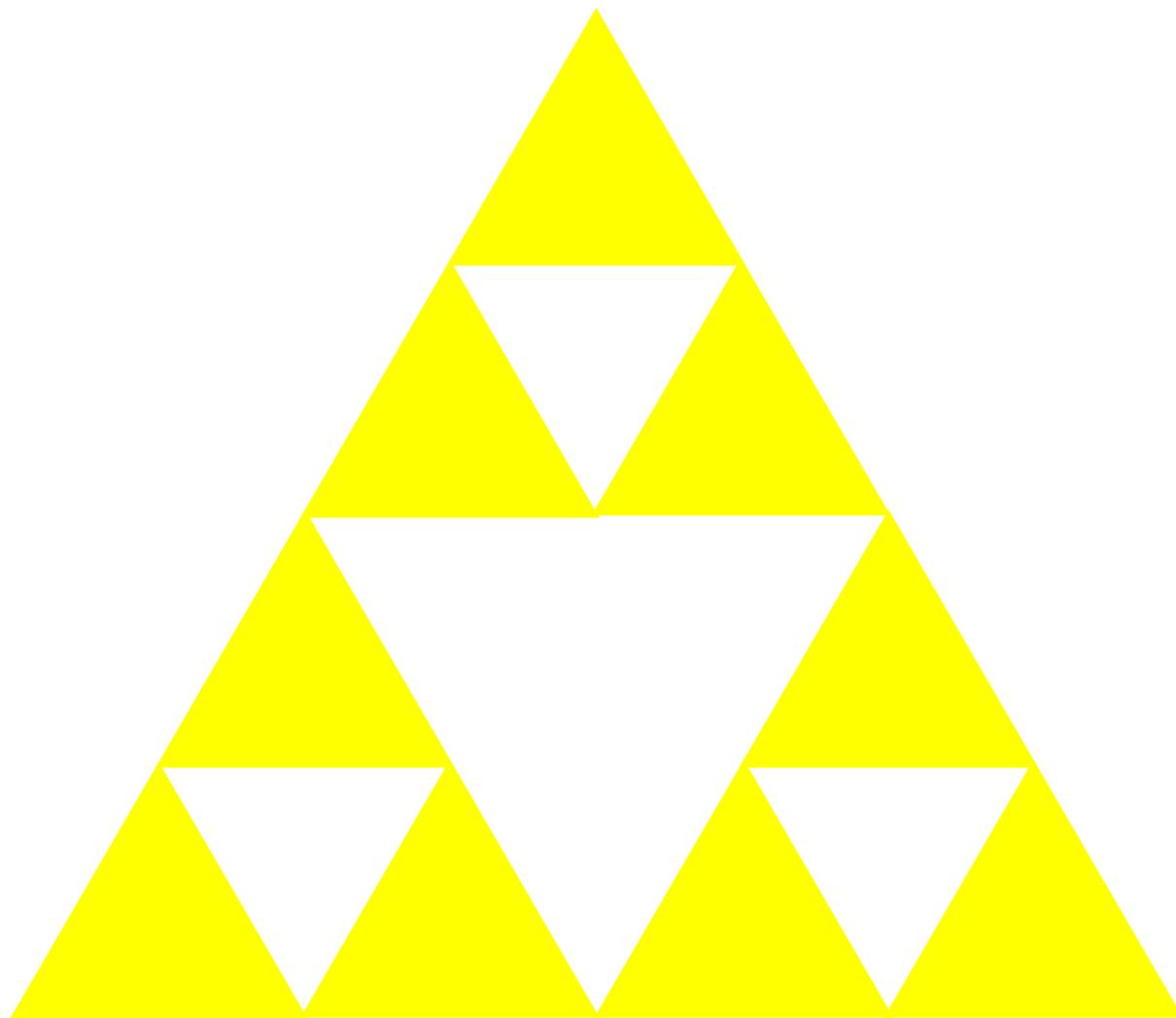
Sierpinski - Dreieck



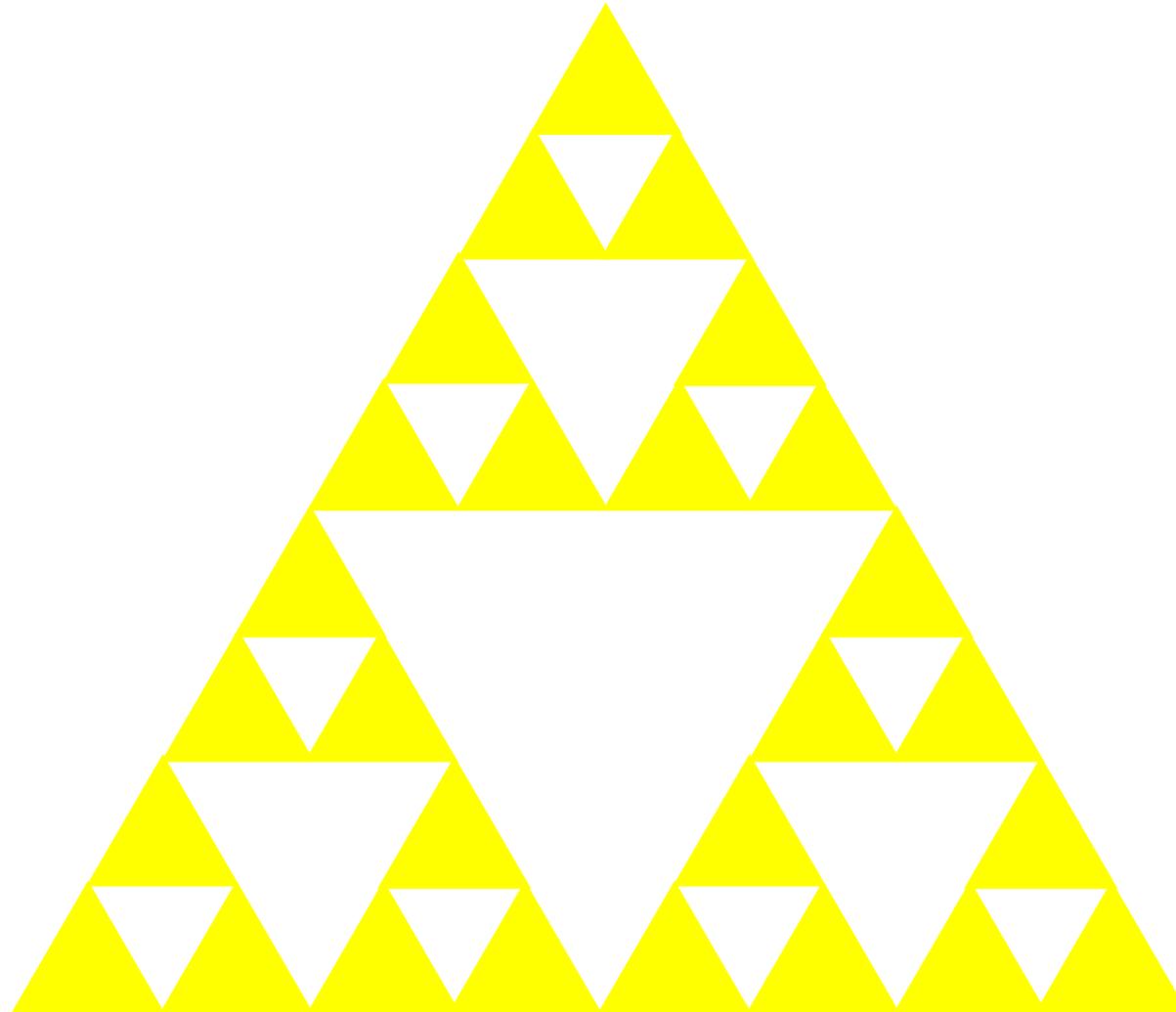
Sierpinski - Dreieck



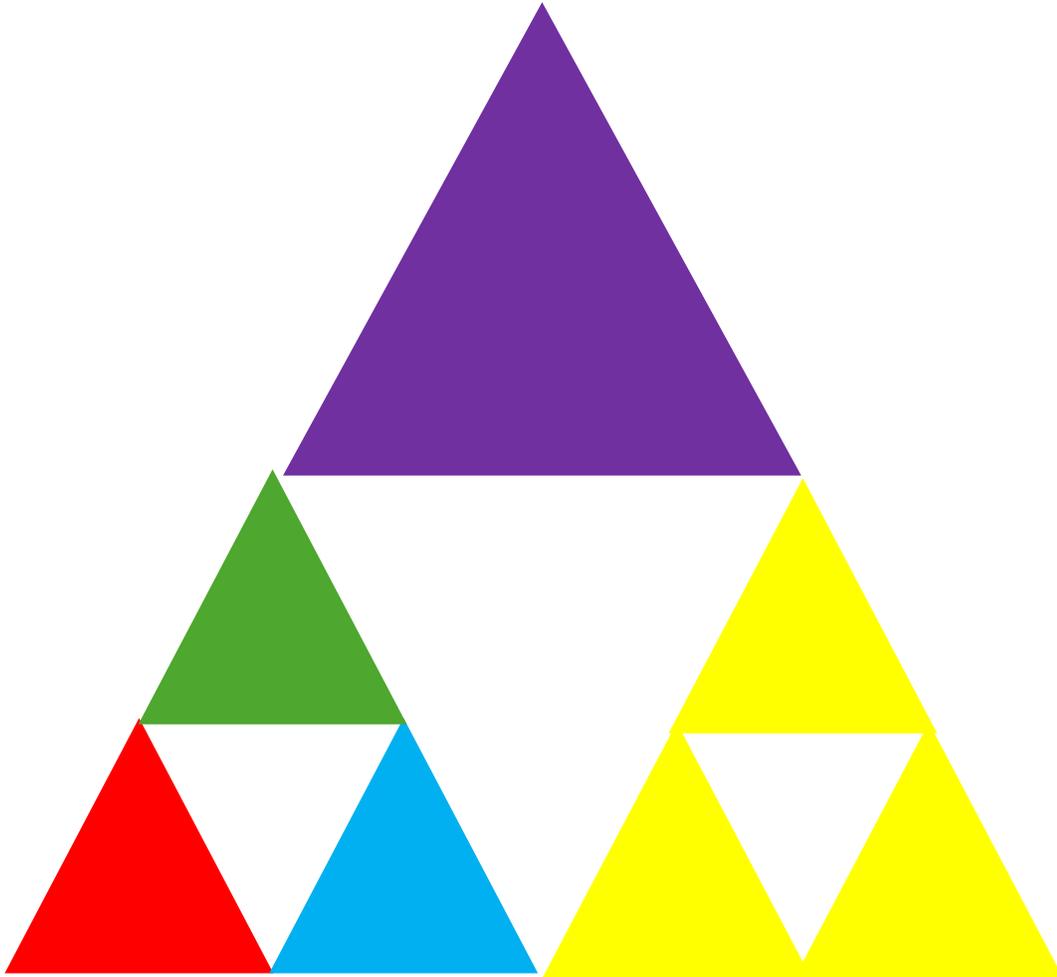
Sierpinski - Dreieck



Sierpinski - Dreieck



Sierpinski - Dreieck



$$w_1(x, y) = \begin{pmatrix} \frac{1}{2} & 0 \\ 0 & \frac{1}{2} \end{pmatrix} * \begin{pmatrix} x \\ y \end{pmatrix}$$

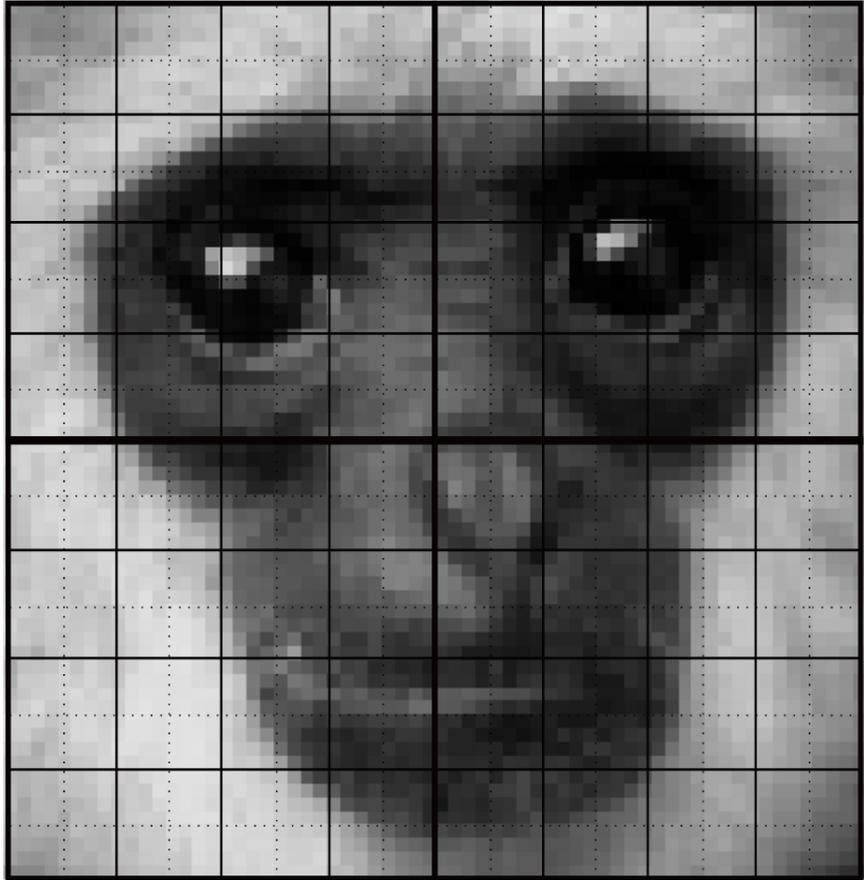
$$w_2(x, y) = \begin{pmatrix} \frac{1}{2} & 0 \\ 0 & \frac{1}{2} \end{pmatrix} * \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} \frac{1}{2} \\ 0 \end{pmatrix}$$

$$w_2(x, y) = \begin{pmatrix} \frac{1}{2} & 0 \\ 0 & \frac{1}{2} \end{pmatrix} * \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} \frac{1}{4} \\ \frac{\sqrt{3}}{2} \end{pmatrix}$$

Drachenkurve

0





Fixpunkte & Collage-Theorem

S	Grundmenge
$F(S)$	Alle Funktionen des IFS
$F(F(F\dots(S)))$	Fraktal
$F(A) = A$	Fixpunkt

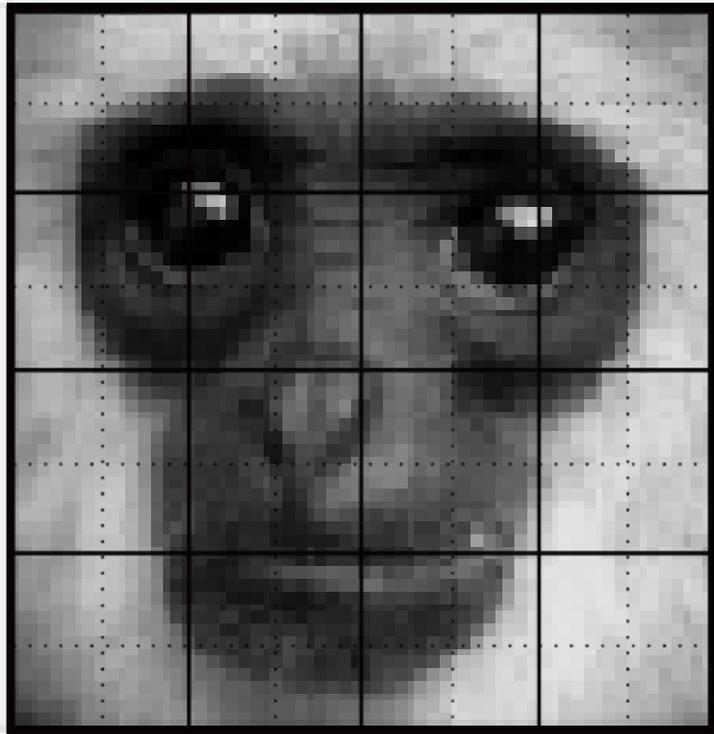
Erkenntnis:

Für eine gegebene Menge (Foto) kann immer ein IFS gefunden werden, dessen Fixpunkt genau dieses Foto ist.
Es reicht die Funktion F anstelle des Fotos abzuspeichern.

Implementierung



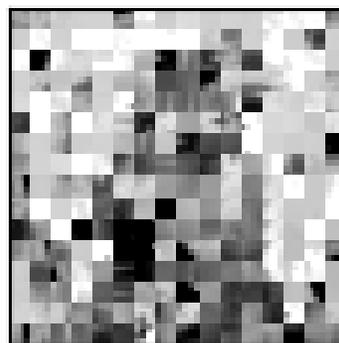
Implementierung



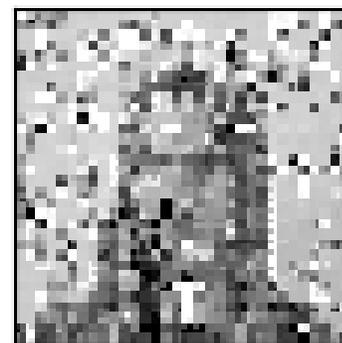
0 (91.56)



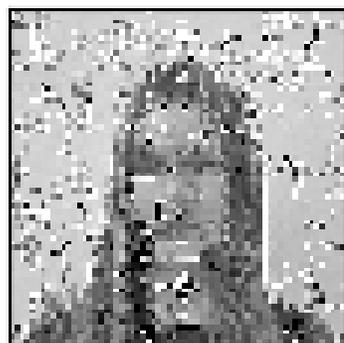
1 (96.91)



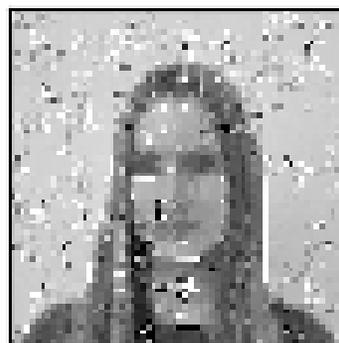
2 (102.23)



3 (74.89)



4 (45.35)



5 (30.97)



6 (18.18)



7 (16.53)



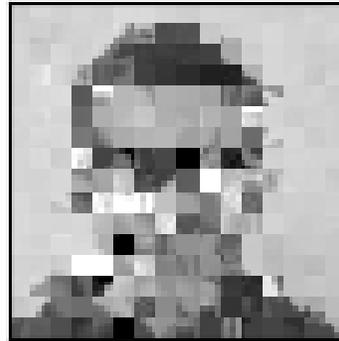
8 (15.87)



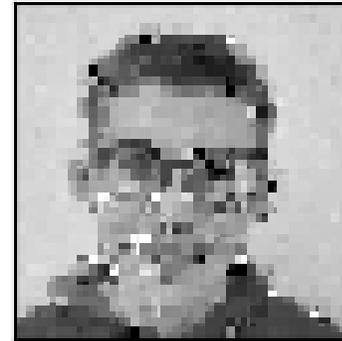
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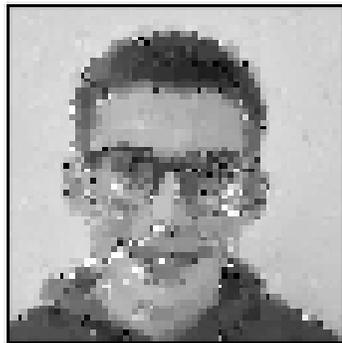
1 (49.13)



2 (28.07)



3 (22.75)



4 (11.81)



5 (9.23)



6 (8.84)



7 (8.76)



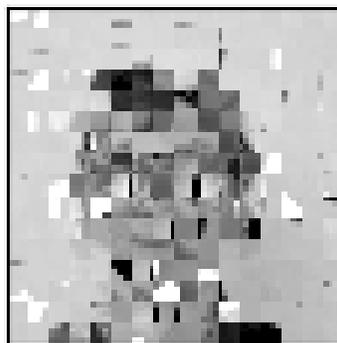
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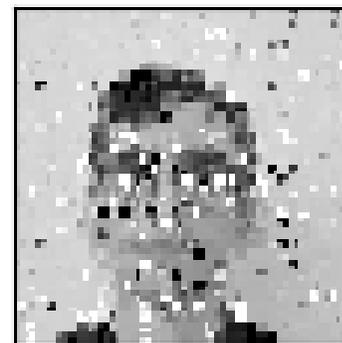
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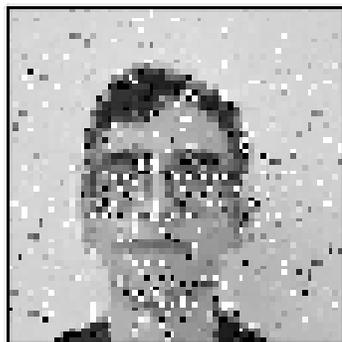
1 (234.29)



2 (264.63)



3 (240.71)



4 (101.40)



5 (40.47)



6 (23.59)



7 (12.39)



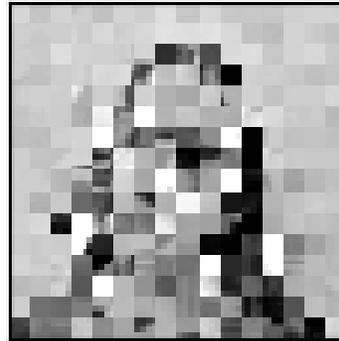
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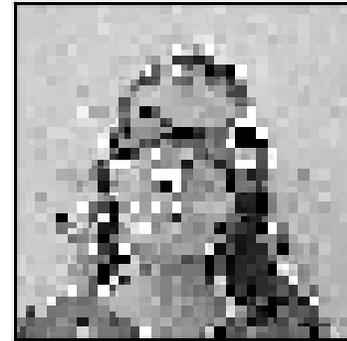
0 (56.09)



1 (70.19)



2 (63.83)



3 (54.92)



4 (20.64)



5 (11.30)



6 (9.15)



7 (8.55)



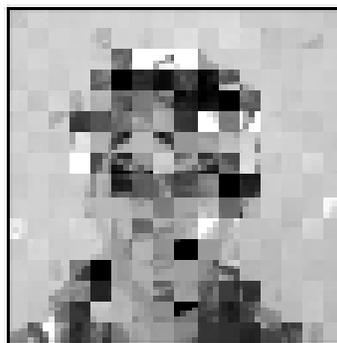
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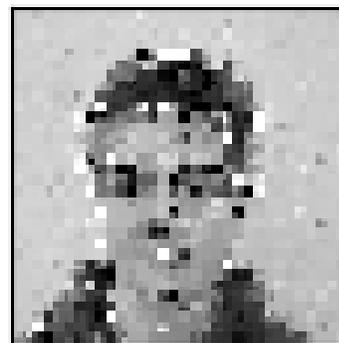
0 (51.65)



1 (100.29)



2 (70.69)



3 (68.85)



4 (24.91)



5 (11.16)



6 (7.18)



7 (6.82)



8 (6.77)



0 (46.34)



1 (55.77)



2 (31.39)



3 (22.16)



4 (12.69)



5 (7.71)



6 (7.19)



7 (7.03)



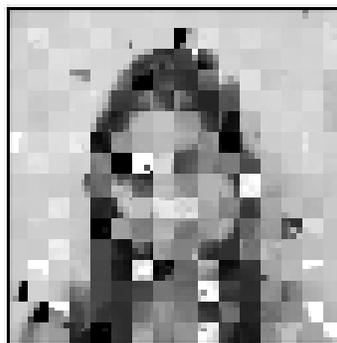
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0 (58.14)



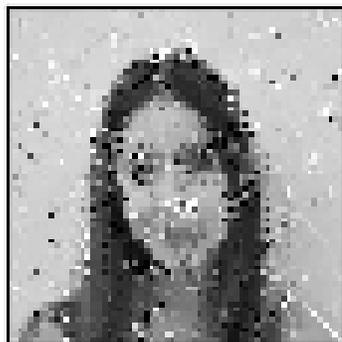
1 (64.18)



2 (144.27)



3 (45.55)



4 (29.27)



5 (14.18)



6 (10.28)



7 (7.70)



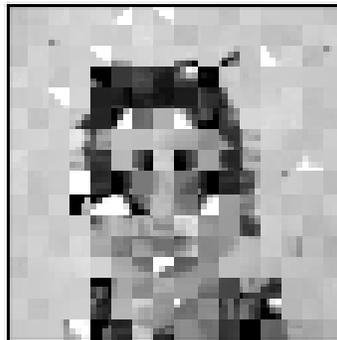
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0 (53.67)



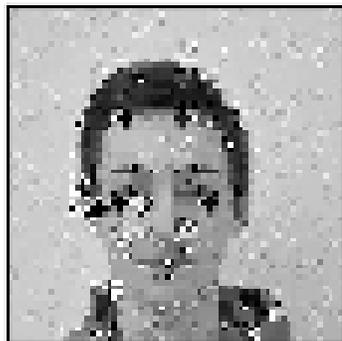
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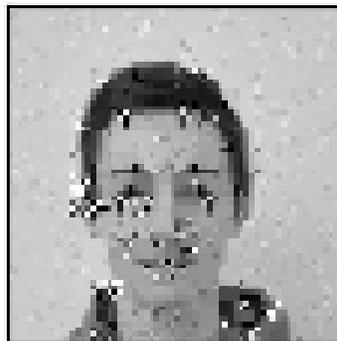
2 (136.79)



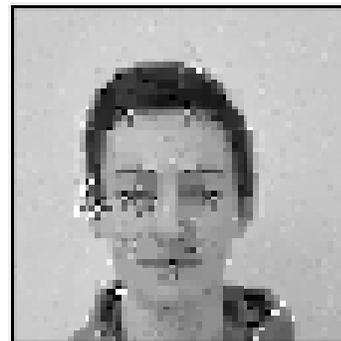
3 (87.75)



4 (33.10)



5 (17.49)



6 (10.54)



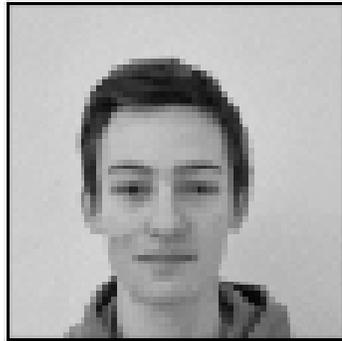
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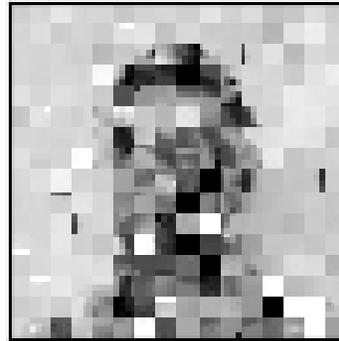
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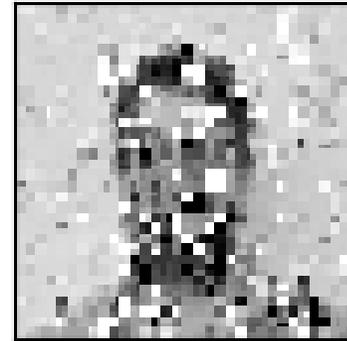
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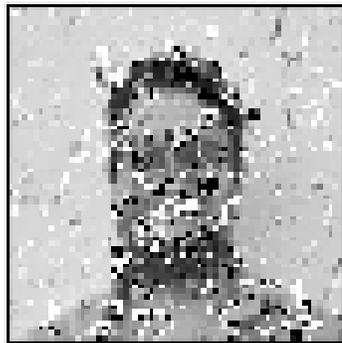
1 (107.92)



2 (128.93)



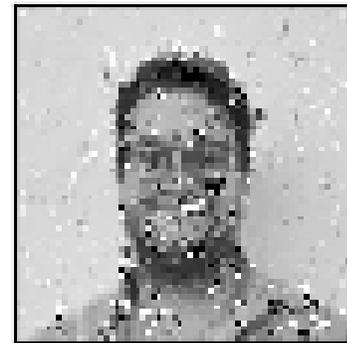
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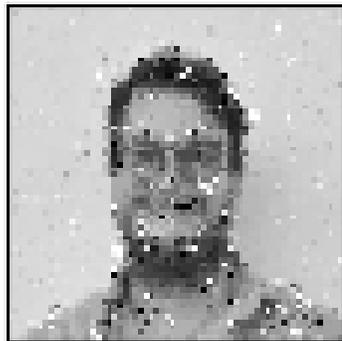
4 (66.26)



5 (46.21)



6 (30.23)



7 (19.01)



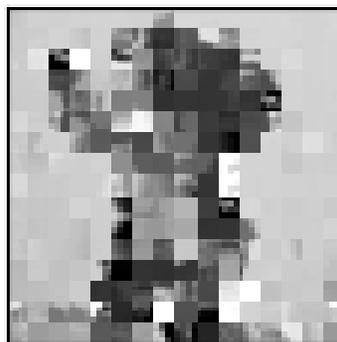
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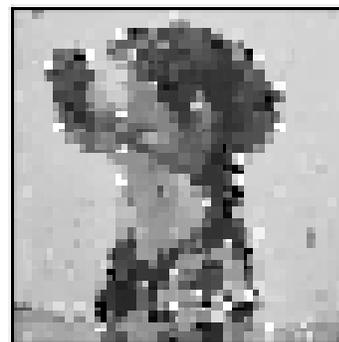
0 (55.71)



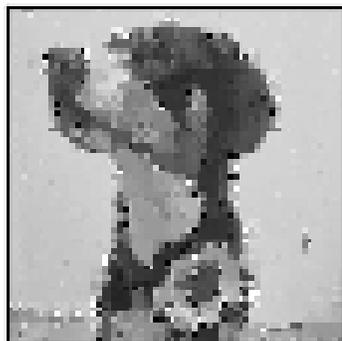
1 (59.78)



2 (36.56)



3 (31.71)



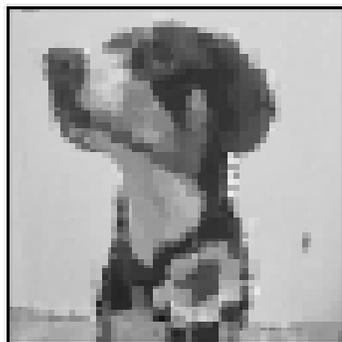
4 (15.00)



5 (10.27)



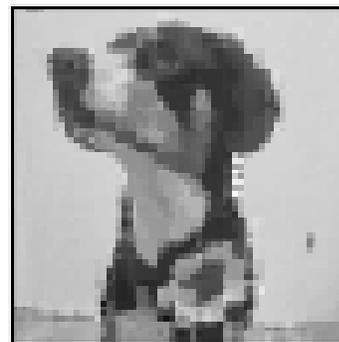
6 (9.83)

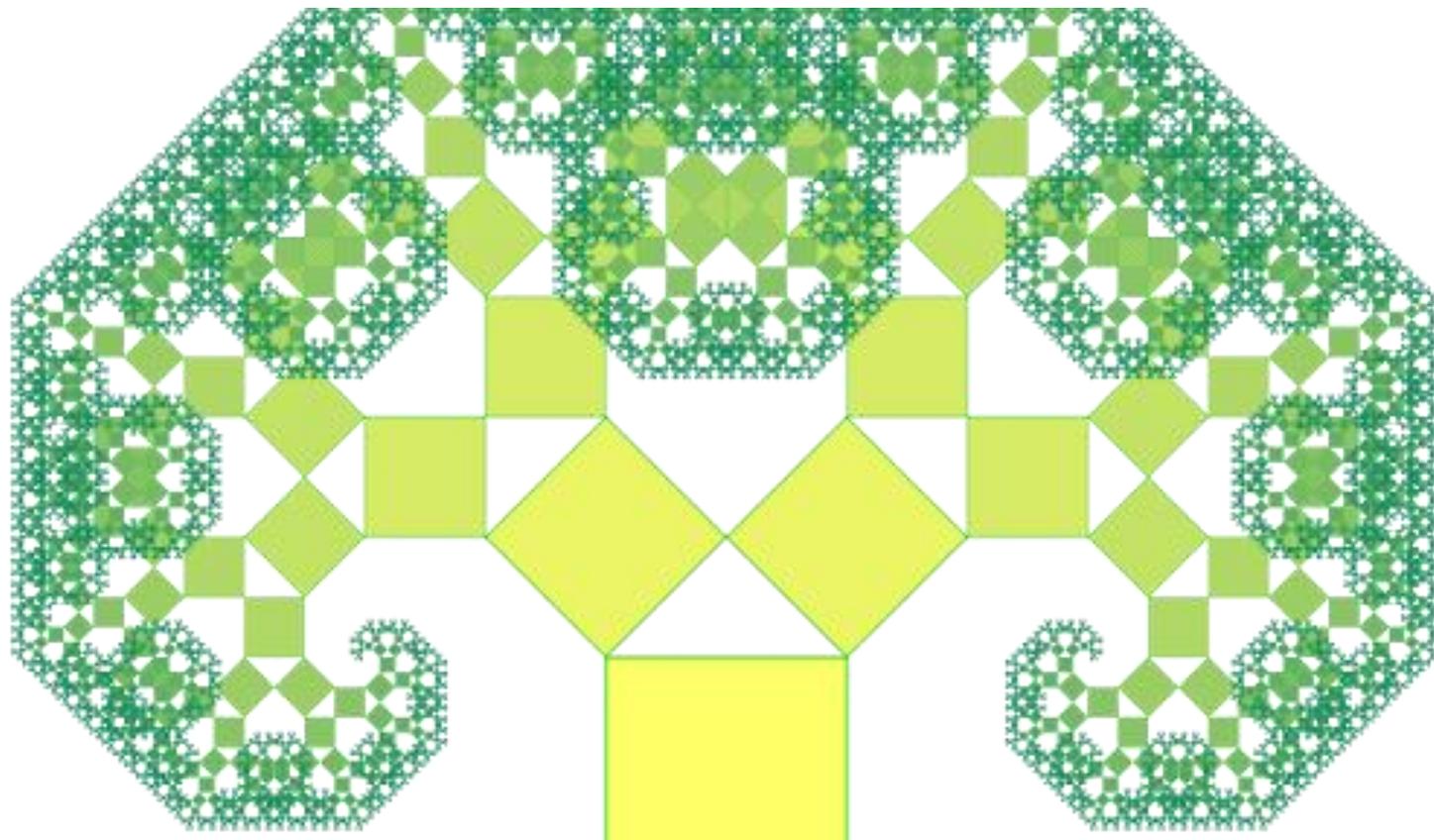


7 (9.86)



8 (9.77)





-Baum