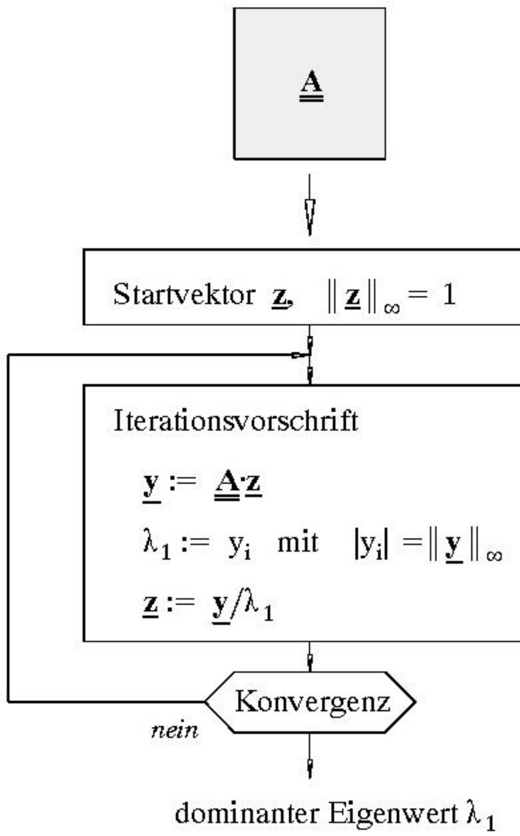
Einfache Vektoriteration

Voraussetzung: $\boldsymbol{A} \in \mathbb{R}^{n \times n}$ hat reelle Eigenwerte $\lambda_i \in \mathbb{R}$ mit $|\lambda_1| > |\lambda_2| > \cdots > |\lambda_n|$



- Nur lineare Konvergenz mit Faktor $\frac{|\lambda_2|}{|\lambda_1|}$
- Algorithmus benötigt nur „Matrix · Vektor" Multiplikation (interessant für große, dünn besetzte Matrizen)
- Geringe praktische Bedeutung

Beispiel:

$$\boldsymbol{A} = \begin{bmatrix} 4 & -1 & 1 \\ 9 & -8 & 9 \\ 11 & -11 & 12 \end{bmatrix}$$

$$\rightarrow \lambda_1 = 5, \lambda_2 = 2, \lambda_3 = 1, \boldsymbol{T} = \begin{bmatrix} \frac{2}{11} & -\frac{1}{11} & 0 \\ \frac{9}{11} & \frac{9}{11} & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

s	dominanter Eigenvektor $\boldsymbol{z}^{(s)}$			$\lambda_1^{(s)}$ (Norm)	$\lambda_1^{(s)}$ (Rayleigh)	$\frac{\left\|\lambda_1-\lambda_1^{(s)}\right\|}{\left\|\lambda_1-\lambda_1^{(s-1)}\right\|}$ (Norm)
0	1.00000	.00000	.00000			
1	– – – –	– – – –	– – – –	– – – –	– – – –	
2	.23377	.81818	1.00000	7.0000000	6.8165138	.333
3	.20047	.81818	1.00000	5.5714286	5.5462727	.286
4	.18898	.81818	1.00000	5.2051282	5.1981197	.359
5	.18464	.81818	1.00000	5.0788177	5.0763727	.384
6	.18294	.81818	1.00000	5.0310378	5.0301108	.3942
7	.18227	.81818	1.00000	5.0123385	5.0119755	.398
8	.18200	.81818	1.00000	5.0049233	5.0047793	.399
9	.18189	.81818	1.00000	5.0019674	5.0019100	.400
10	.18185	.81818	1.00000	5.0007866	5.0007637	.400
11	.18183	.81818	1.00000	5.0003146	5.0003054	.400
12	.18182	.81818	1.00000	5.0001258	5.0001222	.400
13	.18182	.81818	1.00000	5.0000503	5.0000489	.400
14	.18182	.81818	1.00000	5.0000201	5.0000195	.400
15	.18182	.81818	1.00000	5.0000081	5.0000078	.400
16	.18182	.81818	1.00000	5.0000032	5.0000031	.400
17	.18182	.81818	1.00000	5.0000013	5.0000013	.400
18	.18182	.81818	1.00000	5.0000005	5.0000005	.400
19	.18182	.81818	1.00000	5.0000002	5.0000002	.400
20	.18182	.81818	1.00000	5.0000001	5.0000001	.400