

Lösungsvorschlag zum Übungsblatt 6  
**Organic Computing**  
SS 2009

**AUFGABE 15:**

a) **Authorities:**

- n2(Schnelle Sortieralgorithmen): Authority weight = 0.44656869756001405
- n31(Kuerzeste Wege): Authority weight = 0.44654286496255685
- n7(Zyklensuche in Graphen): Authority weight = 0.36040521154979677
- n36(Travelling Salesman Problem): Authority weight = 0.330879982972851
- n5(Tiefensuche): Authority weight = 0.2890765513702811
- n33(Minimale aufspannende Baeume): Authority weight = 0.25734664744295577
- n0(Binaere Suche): Authority weight = 0.198454716711114
- n22(Eulertour): Authority weight = 0.1564325416687969
- n34(Maximale Fluesse): Authority weight = 0.14649560580679769
- n14(Public-Key-Kryptographie): Authority weight = 0.14485812309219892
- n23(Dynamische Programmierung): Authority weight = 0.14406088192387229
- n1(Sortieren durch Einfuegen): Authority weight = 0.13829609707330823
- n12(Einweg-Funktionen): Authority weight = 0.11422955381957647
- n32(Rucksackproblem): Authority weight = 0.10919538209202771
- n19(Zufallszahlen): Authority weight = 0.09043307986529546
- n9(Multiplikation langer Zahlen): Authority weight = 0.08844676566400529
- n10(Euklidischer Algorithmus): Authority weight = 0.07081546903258615
- n3(Paralleles Sortieren): Authority weight = 0.0687476011352388
- n35(Partnerschaftsvermittlung): Authority weight = 0.06831481305171797
- n6(Pledge-Algorithmus): Authority weight = 0.06665733769349079
- n15(Teilen von Geheimnissen): Authority weight = 0.04139711010344571
- n20(Fehlererkennende Codes): Authority weight = 0.03147645669883418
- n13(One-Time-Pads): Authority weight = 0.0293083405759618
- n18(Hashing): Authority weight = 0.027334901356179064
- n29(Mehrheitsbestimmung): Authority weight = 0.024134256209688804
- n11(Sieb des Eratosthenes): Authority weight = 0.024134256209688804
- n17(Fingerprinting): Authority weight = 0.015351241841185815
- n37(Simulated Annealing): Authority weight = 0.010032749386468878
- n26(Gauss-Seidel Iteration): Authority weight = 0.008281276317868822
- n38(Kleinster umschliessender Kreis): Authority weight = 0.008210951022314802
- n25(Alphabeta-Algorithmus fuer Spielbaeume): Authority weight = 0.007626341406210276
- n42(Bin Packing): Authority weight = 0.0
- n41(Online-Algorithmen): Authority weight = 0.0
- n40(Zahlen auf Deutsch aussprechen): Authority weight = 0.0
- n39(Topologisches Sortieren): Authority weight = 0.0
- n30(Broadcasting): Authority weight = 0.0
- n28(Faires Teilen): Authority weight = 0.0
- n27(Kreise zeichnen): Authority weight = 0.0
- n24(Gewinnstrategie fuer ein Streichholzspiel): Authority weight = 0.0

n21(Turnier- und Sportligaplanung): Authority weight = 0.0  
n16(Poker per E-Mail): Authority weight = 0.0  
n8(PageRank): Authority weight = 0.0  
n4(Texte durchsuchen): Authority weight = 0.0

#### **Hubs:**

n33(Minimale aufspannende Baeume): Hubs weight = 0.35526102598351694  
n31(Kuerzeste Wege): Hubs weight = 0.3449029753575492  
n21(Turnier- und Sportligaplanung): Hubs weight = 0.31582355304314014  
n37(Simulated Annealing): Hubs weight = 0.30467110192468533  
n32(Rucksackproblem): Hubs weight = 0.26356918380118655  
n5(Tiefensuche): Hubs weight = 0.26065979302530823  
n6(Pledge-Algorithmus): Hubs weight = 0.24575588915679308  
n34(Maximale Fluesse): Hubs weight = 0.24575588915679308  
n9(Multiplikation langer Zahlen): Hubs weight = 0.22304377880278248  
n36(Travelling Salesman Problem): Hubs weight = 0.18231957990414394  
n25(Alphabeta-Algorithmus fuer Spielbaeume): Hubs weight = 0.16494989953290945  
n1(Sortieren durch Einfuegen): Hubs weight = 0.16004515417177512  
n22(Eulertour): Hubs weight = 0.15500327576492376  
n0(Binaere Suche): Hubs weight = 0.14655610047405346  
n29(Mehrheitsbestimmung): Hubs weight = 0.14463023792392934  
n3(Paralleles Sortieren): Hubs weight = 0.13114118422620766  
n28(Faires Teilen): Hubs weight = 0.11996372848962293  
n12(Einweg-Funktionen): Hubs weight = 0.10763420267244156  
n30(Broadcasting): Hubs weight = 0.10013177126363283  
n14(Public-Key-Kryptographie): Hubs weight = 0.08596547872430838  
n15(Teilen von Geheimnissen): Hubs weight = 0.07792583649586314  
n2(Schnelle Sortieralgorithmen): Hubs weight = 0.07550787962287134  
n11(Sieb des Eratosthenes): Hubs weight = 0.07128084352563974  
n13(One-Time-Pads): Hubs weight = 0.0690981799792381  
n7(Zyklensuche in Graphen): Hubs weight = 0.06481812826927663  
n10(Euklidischer Algorithmus): Hubs weight = 0.052312739077472054  
n4(Texte durchsuchen): Hubs weight = 0.05062762910510278  
n19(Zufallszahlen): Hubs weight = 0.0447441583217919  
n8(PageRank): Hubs weight = 0.036932920817594854  
n27(Kreise zeichnen): Hubs weight = 0.03661928334524457  
n24(Gewinnstrategie fuer ein Streichholzspiel): Hubs weight = 0.03401203540035901  
n35(Partnerschaftsvermittlung): Hubs weight = 0.03284794606501108  
n17(Fingerprinting): Hubs weight = 0.02955959631679572  
n16(Poker per E-Mail): Hubs weight = 0.02561309741839109  
n18(Hashing): Hubs weight = 0.02561309741839109  
n20(Fehlererkennende Codes): Hubs weight = 0.023719467043406984  
n38(Kleinster umschliessender Kreis): Hubs weight = 0.02027733810545617  
n39(Topologisches Sortieren): Hubs weight = 0.0  
n40(Zahlen auf Deutsch aussprechen): Hubs weight = 0.0  
n41(Online-Algorithmen): Hubs weight = 0.0  
n42(Bin Packing): Hubs weight = 0.0  
n26(Gauss-Seidel Iteration): Hubs weight = 0.0  
n23(Dynamische Programmierung): Hubs weight = 0.0

- f) Kleinberg schlägt vor, bei der Anfrage „Finde ähnliche Seiten zur Seite  $p$ “  $V_{R_p} = p \cup \{\text{Alle Vorgänger von } p\}$  zu setzen.  $V_{S_p}$  sind dann alle Vorgänger und Nachfolger der Knoten in  $R_p$ .  
 $V_{S_p} = \{n2, n5, n6, n7, n8, n10, n19, n21, n22, n23, n31, n32, n33, n34, n35, n36, n37\}$

Ergebnis nach 100 Iterationen:

**Authorities:**

n31(Kuerzeste Wege): Authority weight = 0.5239862438673419  
n36(Travelling Salesman Problem): Authority weight = 0.4320077972781928  
n7(Zyklensuche in Graphen): Authority weight = 0.4284460393161434  
n33(Minimale aufspannende Baeume): Authority weight = 0.3327701584797753  
n5(Tiefensuche): Authority weight = 0.24803071916368385  
n22(Eulertour): Authority weight = 0.21325689642275922  
n34(Maximale Fluesse): Authority weight = 0.20873054220416257  
n2(Schnelle Sortieralgorithmen): Authority weight = 0.16861575143379956  
n23(Dynamische Programmierung): Authority weight = 0.14720929844839237  
n32(Rucksackproblem): Authority weight = 0.1313978031872374  
n10(Euklidischer Algorithmus): Authority weight = 0.10096469388196921  
n35(Partnerschaftsvermittlung): Authority weight = 0.09613355527296356  
n19(Zufallszahlen): Authority weight = 0.05973587638489857  
n6(Pledge-Algorithmus): Authority weight = 0.05973587638489857  
n37(Simulated Annealing): Authority weight = 5.44260157291101E-126  
n21(Turnier- und Sportligaplanung): Authority weight = 0.0  
n8(PageRank): Authority weight = 0.0

**Hubs:**

n21(Turnier- und Sportligaplanung): Hubs weight = 0.4276907584632776  
n31(Kuerzeste Wege): Hubs weight = 0.42533114510714237  
n37(Simulated Annealing): Hubs weight = 0.4072258488351423  
n33(Minimale aufspannende Baeume): Hubs weight = 0.36662893351341247  
n6(Pledge-Algorithmus): Hubs weight = 0.2833925614481532  
n34(Maximale Fluesse): Hubs weight = 0.2833925614481532  
n5(Tiefensuche): Hubs weight = 0.2530437254471629  
n22(Eulertour): Hubs weight = 0.2031268071432327  
n32(Rucksackproblem): Hubs weight = 0.19825373477019512  
n36(Travelling Salesman Problem): Hubs weight = 0.1493808613407413  
n7(Zyklensuche in Graphen): Hubs weight = 0.058552459079697895  
n8(PageRank): Hubs weight = 0.05034342416681289  
n35(Partnerschaftsvermittlung): Hubs weight = 0.04927489051477885  
n19(Zufallszahlen): Hubs weight = 1.2848316005351947E-126  
n10(Euklidischer Algorithmus): Hubs weight = 0.0  
n23(Dynamische Programmierung): Hubs weight = 0.0  
n2(Schnelle Sortieralgorithmen): Hubs weight = 0.0