Code for Connected Components

```
DROP PROCEDURE connected_components
CREATE PROCEDURE connected_components
AS BEGIN
  SELECT *
       INTO #temp_edges
  FROM edges
  INSERT INTO #temp_edges
  SELECT citedPaperID, paperID
  FROM #temp_edges
  SELECT *
       INTO #temp_nodes
  FROM nodes
  CREATE TABLE #nodes_visited (
    paperID INTEGER,
    componentNum INTEGER);
  CREATE  TABLE  #curr_comp (paperID  INTEGER);
  DECLARE @comp_num INTEGER;
  SET @comp_num = 0;
  WHILE ((SELECT count(paperID) FROM #temp_nodes) > 0)
    BEGIN
    TRUNCATE TABLE #curr_comp;
    INSERT INTO #curr_comp
    SELECT TOP 1 paperID FROM #temp_nodes;
    DECLARE @size INTEGER;
    SET @size = 0;
    DECLARE @new_size INTEGER;
    SET @new_size = 1;
    WHILE (@new_size > @size)
      BEGIN
      INSERT INTO #curr_comp
      SELECT DISTINCT a.citedPaperID
      FROM #temp_edges a
      WHERE EXISTS(SELECT b.paperID from #curr_comp b WHERE b.paperID = a.paperID) AND NOT
          EXISTS(SELECT c.paperID from #curr_comp c WHERE c.paperID = a.citedPaperID);
      set @size = @new_size;
      SET @new_size = (SELECT COUNT(paperID) FROM #curr_comp);
    END
    DELETE FROM #temp_nodes
    WHERE EXISTS(SELECT a.paperID FROM #curr_comp a WHERE #temp_nodes.paperID = a.paperID);
    INSERT INTO #nodes_visited
    SELECT a.paperID, @comp_num
    FROM #curr_comp a;
    SET @comp_num = @comp_num + 1;
  END
  SELECT a.paperID, a.paperTitle
  FROM nodes a
  JOIN #nodes_visited b ON a.paperID = b.paperID
  WHERE EXISTS(
           SELECT c.componentNum
           FROM #nodes_visited c
           WHERE (SELECT COUNT(e.paperID) from #nodes_visited e WHERE e.componentNum =
c.componentNum GROUP BY e.componentNum) > 4
                 AND (SELECT COUNT(e.paperID) from #nodes_visited e WHERE e.componentNum =
c.componentNum GROUP BY e.componentNum) <= 10
                 AND c.componentNum = b.componentNum);
END
```

```
execute connected_components
```

Results from Connected Components

PaperID Paper Title Connected Component Number

210310 Homotopy of Rational Maps and the Quantization of Skyrmions 2
12215 Solitonic fullerene structures in light atomic nuclei 2
206160 Skyrmed Monopoles 2
9904160 Spherically Symmetric Solutions of the SU(N) Skyrme Models 2
8110 Understanding Skyrmions using Rational Maps 2
9807125 How useful can knot and number theory be for loop calculations? 7
9612010 Weight Systems from Feynman Diagrams 7
9712140 Non-zeta knots in the renormalization of the Wess-Zumino model? 7
9611150 Dimensional Renormalization in phi^3 theory: ladders and rainbows 7
9805025 A dilogarithmic 3-dimensional Ising tetrahedron 7
9709075 Chiral solitons from dimensional reduction of Chern-Simons gauged 9
9611185 A Nonrelativistic Chiral Soliton in One Dimension 9
9507110 Calogero-Sutherland model from excitations of Chern-Simons vortices 9
9712255 Chiral solitons from dimensional reduction of Chern-Simons gauged 9
9706080 Moving Frames Hierarchy and BF Theory 9
9511210 Modular Invariance and the Odderon 12
9508025 Quasiclassical QCD Pomeron 12
9802100 Solution of the Odderon Problem 12
9611025 Direct solution of the hard pomeron problem for arbitrary conformal 12
9805135 New Results on the Odderon in QCD 12
9812105 Vassiliev Invariants in the Context of Chern-Simons Gauge Theory 15
9312215 Knot invariants from rational conformal field theories 15
9212110 Three Dimensional Chern-Simons Theory as a Theory of Knots and Links III 15
9607030 Vassiliev Invariants for Links from Chern-Simons Perturbation Theory 15
9401095 Chirality of Knots 9_{42} and 10_{71} and Chern-Simons Theory 15
9807155 Combinatorial Formulae for Vassiliev Invariants from Chern-Simons Gauge 15
9707150 Bogomolnyi Solitons and Hermitian Symmetric Spaces 38
9506015 Statistical Mechanics of Non-Abelian Chern-Simons Particles 38
9303080 Non-Abelian Chern-Simons Quantum Mechanics 38
9703185 N=2 Supersymmetric Gauged O(3) Sigma Model 38
304155 Exact String-like Solutions of the Gauged Nonlinear O(3) Model 38
9507015 Topological and Nontopological Solitons in a Gauged O(3) Sigma Model 38
9509135 Classical and Quantum Mechanics of Non-Abelian Chern-Simons Particles 38
9805010 On the Gauged Non-compact Spin System 38
9510085 Calculation of the Aharonov-Bohm wave function 75
9710025 On the Nonrelativistic Limit of the Scattering of Spin One-half 75
9603185 The Aharonov-Bohm scattering : the role of the incident wave 75
9703200 The Low Energy Limit of the Chern-Simons Theory Coupled to Fermions 75
9703090 Perturbative Expansion in the Galilean Invariant Spin One-Half 75
9411175 Aharonov-Bohm Scattering of a Localized Wave Packet: Analysis of the 75
9906170 Radiative Corrections to the Aharonov-Bohm Scattering 75
9402020 Perturbative Bosonic End Anyon Spectra and Contact Interactions 75
9502105 FIELD THEORETICAL AND QUANTUM MECHANICAL DESCRIPTIONS OF COLLIDING AND 75
7080 Relativistic scalar Aharonov-Bohm scattering 75
9511010 The regulated four parameter one dimensional point interaction 97
9706070 Non-perturbative regularization and renormalization: simple examples 97
9906015 Two- and Three-particle States in a Nonrelativistic Four-fermion Model 97
5195 A differential equation approach for examining the subtraction schemes 97
9412050 Generalised Point Interactions for the Radial Schrodinger Equation via 97
3255 Dimensional Transmutation and Dimensional Regularization in Quantum 97
9904055 Finiteness following from underlying theory: a natural strategy 97

Code for PageRank

```
DROP PROCEDURE page_rank
CREATE PROCEDURE page_rank
   AS BEGIN
   SELECT *
         INTO #temp_nodes
   FROM nodes
   SELECT *
         INTO #temp_edges
   FROM edges
   DECLARE @num_papers INTEGER
   SET @num_papers = (SELECT count(paperID) FROM #temp_nodes)
   CREATE TABLE #pageranks (
      paperID INTEGER,
      pagerank FLOAT,
      num_citations INTEGER
   )
   INSERT INTO #pageranks
   SELECT a.paperID, 1.0/ (SELECT count(paperID) FROM #temp_nodes), (SELECT count(b.citedPaperID)
FROM edges b WHERE b.paperID = a.paperID)
   FROM #temp_nodes a
   CREATE TABLE #sinks (
      paperID INTEGER,
   )
   INSERT INTO #sinks
   SELECT DISTINCT a.paperID
   FROM #temp_nodes a
   WHERE NOT EXISTS(SELECT b.paperID from #temp_edges b WHERE b.citedPaperID = a.paperID);
--   DELETE FROM #temp_nodes
--   WHERE EXISTS(SELECT c.paperID FROM #sinks c WHERE #temp_nodes.paperID = c.paperID)
   DECLARE @num_sinks FLOAT
   SET @num_sinks = (SELECT count(paperID) FROM #sinks)
   DECLARE @diff FLOAT
   SET @diff = 1
   DECLARE @sink_sum float
   CREATE TABLE #rank_sums(
      paperID INTEGER,
      sumScore float);
   CREATE TABLE #temp_pageranks (
      paperID INTEGER,
      pagerank FLOAT,
      num_citations INTEGER
   )
   WHILE @diff > 0.01
      BEGIN
--    For some reason, this isn't letting me create a view
      TRUNCATE TABLE #rank_sums;
      TRUNCATE TABLE #temp_pageranks;
      SET @sink_sum = (SELECT sum(a.pagerank) FROM #pageranks a WHERE a.num_citations = 0);
      INSERT INTO #rank_sums
      SELECT a.paperID, (
                              select sum(b.pagerank/b.num_citations)
                              from #pageranks b
                              where exists(
                                       SELECT c.citedPaperID
```

```
                                        FROM edges c
                                        WHERE c.citedPaperID = a.paperID AND c.paperID = b.paperID))
AS sumScore
      FROM #pageranks a
      WHERE (SELECT COUNT(c.citedPaperID)
                                  FROM edges c
                                  WHERE c.citedPaperID = a.paperID) > 0
      INSERT INTO #rank_sums
      SELECT a.paperID, 0 AS sumScore
      FROM #pageranks a
      WHERE (SELECT COUNT(c.citedPaperID)
                FROM edges c
                WHERE c.citedPaperID = a.paperID) = 0
      INSERT INTO #temp_pageranks
      SELECT a.paperID, (0.15/@num_papers + 0.85 * ((SELECT b.sumScore
                                                            FROM #rank_sums b
                                                            WHERE b.paperID = a.paperID) +
@sink_sum/(@num_papers - 1))) AS pagerank,
                a.num_citations
      FROM #pageranks a
      SET @diff = (SELECT sum(ABS(a.pagerank - b.pagerank))
                           FROM #temp_pageranks a JOIN #pageranks b ON a.paperID = b.paperID);
      TRUNCATE TABLE #pageranks;
      INSERT INTO #pageranks SELECT * FROM #temp_pageranks;
   END
   SELECT TOP (10) a.paperID, b.paperTitle, a.pagerank
   FROM #pageranks a
   JOIN nodes b ON b.paperID = a.paperID
   ORDER BY a.pagerank DESC
--   SELECT sum(a.pagerank)
--   FROM #pageranks a
END
   END
   execute page_rank
```

Results from PageRank

PaperID Paper Title PageRank

9504090 Massless Black Holes and Conifolds in String Theory 0.01472859748880659
9510135 Bound States Of Strings And p-Branes 0.01444816612523452
9711200 The Large N Limit of Superconformal Field Theories and Supergravity 0.013649804433989523
9802150 Anti De Sitter Space And Holography 0.009699470117726117
208020 Open strings and their symmetry groups 0.008632461421944534
9602065 D--branes and Spinning Black Holes 0.007718590964894815
9305185 Duality Symmetries of 4D Heterotic Strings 0.007550434834742867
9611050 TASI Lectures on D-Branes 0.007130447391511473
9501030 Strong/Weak Coupling Duality from the Dual String 0.005816058762888745
9602135 Entropy and Temperature of Black 3-Branes 0.005416902203787256